Instruction Manual
PN 5101054BDC
January 2000

Model 1054B DC

Dual Cell Conductivity/Resistivity Microprocessor Analyzer

FREE
EXTENDED
WARRANTY!
(See offer at back of manual)

ROSEMOUNT® ANALYTICAL
FISHER-ROSEMOUNT™ Managing The Process Better.™

ESSENTIAL INSTRUCTIONS
READ THIS PAGE BEFORE PROCEEDING!

Rosemount Analytical designs, manufactures, and tests its products to meet many national and international standards. Because these instruments are sophisticated technical products, you must properly install, use, and maintain them to ensure they continue to operate within their normal specifications. The following instructions must be adhered to and integrated into your safety program when installing, using, and maintaining Rosemount Analytical products. Failure to follow the proper instructions may cause any one of the following situations to occur: Loss of life; personal injury; property damage; damage to this instrument; and warranty invalidation.

- Read all instructions prior to installing, operating, and servicing the product. If this Instruction Manual is not the correct manual, telephone 1-800-654-7768 and the requested manual will be provided. Save this Instruction Manual for future reference.
- If you do not understand any of the instructions, contact your Rosemount representative for clarification.
- Follow all warnings, cautions, and instructions marked on and supplied with the product.
- Inform and educate your personnel in the proper installation, operation, and maintenance of the product.
- Install your equipment as specified in the Installation Instructions of the appropriate Instruction Manual and per applicable local and national codes. Connect all products to the proper electrical and pressure sources.
- To ensure proper performance, use qualified personnel to install, operate, update, program, and maintain the product.
- When replacement parts are required, ensure that qualified people use replacement parts specified by Rosemount. Unauthorized parts and procedures can affect the product's performance and place the safe operation of your process at risk. Look alike substitutions may result in fire, electrical hazards, or improper operation.
- Ensure that all equipment doors are closed and protective covers are in place, except when maintenance is being performed by qualified persons, to prevent electrical shock and personal injury.

WARNING
ELECTRICAL SHOCK HAZARD

Making cable connections to and servicing this instrument require access to shock hazard level voltages which can cause death or serious injury.

Relay contacts made to separate power sources must be disconnected before servicing.

Electrical installation must be in accordance with the National Electrical Code (ANSI/NFPA-70) and/or any other applicable national or local codes.

Unused cable conduit entries must be securely sealed by non-flammable closures to provide enclosure integrity in compliance with personal safety and environmental protection requirements.

For safety and proper performance this instrument must be connected to a properly grounded three-wire power source.

Proper relay use and configuration is the responsibility of the user.

Do not operate this instrument without front cover secured. Refer installation, operation and servicing to qualified personnel.

Be sure to disconnect all hazardous voltage before opening the enclosure.

The unused conduit openings need to be sealed with NEMA 4X or IP65 conduit plugs to maintain the ingress protection rating (IP65).

No external connection to the instrument of more than 43V peak allowed with the exception of power and relay terminals. Any violation will impair the safety protection provided.

WARNING

This product is not intended for use in the light industrial, residential or commercial environment, per the instrument's certification to EN50081-2.

Rosemount Analytical Inc.
Uniloc Division
2400 Barranca Parkway
Irvine, CA 92606 USA
Tel: (949) 863-1181
1-800-854-8257
http://.www.RAuniloc.com

© Rosemount Analytical Inc. 1998

ROSEMOUNT® ANALYTICAL

FISHER-ROSEMOUNT™ Managing The Process Better.™

WARNING

HAZARDOUS VOLTAGE

Can cause severe injury or death. Disconnect power before servicing.

CAUTION

The analyzer has a metalized enclosure. Ground conduit to metal stiffener or to metal enclosure. Use non-flammable watertight conduit fittings/plugs to preserve rating.

VYSTRAHA

NEBEZPECNE NAPETI

Muze zpusobit vazne zraneni nebo smrt. Odpojte napajeni pred udrzbou

VAROVANI

Zemnici vodic musi byt vodive spojen s kostrou pristroje. Pouzivejte nehorlave vodotesne pruchodky, abyste zachovali stupen kryti pristroje.

AVISO

VOLTAJE PELIGROSO

Puede causar severas lesiones o muerte. Desconecte la alimentación antes del mantenimiento.

ATENCION

La toma a tierra debe hacerse a un contrafuerde metal o a la caja metálica.Utilice accesorios/enchufes no inflamables y estancos al agua para preservar las especificaciones de la caja.

ADVARSEL

FARLIG SPÆNDING

Kan forårsage alvorlige kvæstelser eller død.

Afbryd spænding før servicering

FORSIGTIG

Jordforbindelse til metal kapsel.

Brug uantændelig vandtæt forskruning som sikkerhed for bevaring af kapslings klasse.

ATTENTION

HAUTE TENSION

Peut provoquer des blessures graves ou la mort. Déconnecter l'alimentation avant manipulation.

ATTENTION

Raccorder le tube à la masse métallique d'une entretoise ou du coffret.Utiliser des raccords et des bouchons étanches ininflammables afin de preserver la classification du boîtier.

OSTRZEZENIE

NIEBEZPIECZNE NAPIECIE

Moze spowodowac uszkodzenie ciala lub smierc.Odlacz zasilanie przed przystapieniem do prac.

UWAGA

Uziemij przewod do metalowego plaskownika lub obudowy. Aby zachowac stopien szczelnosci obudowy stosuj niepalne, wodoszczelne dlawiki.

WARNUNG

GEFAEHRLICHE SPANNUNG

Am Geraet liegt eine gefaehrliche Spannung an. Schalten Sie immer vor dem Oeffnen des Geraetes alle Zuleitungen spannungsfrei.

ACHTUNG

Der Analysator ist vorschriftsmaessig zu erden.
Um die Schutzart des Geraetes sicherzustellen ist es mit den entsprechenden Kabelverschraubungen und Blindkappen auszuruesten.

Waarschuwing

GEVAARLIJKE SPANNING

Kan ernstig of dodelijk letsel veroorzaken. Schakel de voeding uit voordat u onderhoudswerk zaamheden uitvoert.

Voorzichtig

Aardleiding naar metalen profiel of naar metalen behuizing. Gebruik onbrandbare, waterdichte wartels en pluggen orn de beschermingsklasse te handhaven.

Attenzione

ALTA TENSIONE

Può causare grave lesione o morte. Disattivare le tensioni prima di effettuare la manutenzione.

Attenzione

Tubo di protezione per messa a terra con elemento di ingresso in metallo o con custodia in metallo.

Utilizzare accessori/connettori del tubo di protezione a tenuta stagna, non infiammabili, per assicurare i limiti di resistenza della custodia

ADVARSEL

FARLIG SPENNING

Kan føre til alvorlige skader eller dødsulykker. Spenningstilførsel må frakobles før service utføres.

ADVARSEL

Kabelinnføring må jordes til metallavstiver eller til metallkapslingen. Bruk flammesikre og vanntette nipler\plugger slik at kapslingens tetthetsgrad opprettholdes.

VARNING

LIVSFARLIG SPÄNNING

Kan medföra allvarlig skada eller dödsfall.

Bryt spänning innan service utföres.

IAKTTAG FÖRSIKTIGHET

Anslutningspunkt är jordad till chassi. Använd brandsäker, vattentät kabelanslutning för att bevara klassificering av apparatskåp.

AVISO

TENSÃO PERIGOSA

Pode causar lesões graves ou a morte. Desligar a energia antes de proceder a trabalhos de manutenção.

ATENÇÃO

Ligar a conducta de cabos à terra através de suporte ou invólucro metálicos. Utilize bucins e acessórios ignífugos e estanques para preservação da estanquecidade.

MODEL 1054B DC CONDUCTIVITY MICROPROCESSOR ANALYZER

TABLE OF CONTENTS

Section	Title	Page
1.0	DESCRIPTION AND SPECIFICATIONS	1
1.1	Features and Applications	1
1.2	Physical Specifications - General	2
1.3	Analyzer Specifications	3
1.4	Ordering Information	4
2.0	INSTALLATION	5
2.1	General	5
2.2	Unpacking and Inspection	5
2.3	Mechanical Installations	5
2.4	Electrical Wiring	5
2.5	Sensor Installation	6
3.0	DESCRIPTION OF CONTROLS	12
3.1	Keyboard Functions	12
4.0	CONFIGURATION	17
4.1	General	17
4.2	Process Variable	17
4.3	Alarm 1 and 2	19
4.4	Temperature Configuration	21
4.5	Current Output	21
4.6	Defaults	22
4.7	Alarm Setpoint	22
4.8	Output Scale Expansion	24
4.9	Simulate Output	25
4.10	Display Cycle	26
5.0	START-UP AND CALIBRATION	27
6.0	KEYBOARD SECURITY	29
7.0	THEORY OF OPERATION	30
8.0	DIAGNOSTICS AND TROUBLESHOOTING	31
8.1	Diagnostics	31
8.2	Troubleshooting	32
8.3	Instrument Maintenance	35
9.0	RETURN OF MATERIAL	36

TABLE OF CONTENTS CONT'D.

LIST OF FIGURES

Figure No.	Title	Page
2-1	Panel Mounting Cutout	7
2-2	Panel Mounting Tab Installation	8
2-3	Pipe Mounting Installation	9
2-4	Electrical Wiring	10
2-5	Sensor Wiring	11
3-1	Function Select on Keypad	12
3-2	Accessing Editing Function	12
3-3	Accessing Configuration Menus	12
3-4	LCD Display	13
3-5	Set Menu Items	16
4-1	Process Variable Configuration	19
4-2	Alarm 1 and Alarm 2 Configuration	19
4-3	Alarm 3 Configuration	20
4-4	Temperature Configuration	21
4-5	Current Output Configuration	22
4-6	Default Configuration	22
4-7	Alarm Setpoint	23
4-8	Output Scale Expansion	24
4-9	Simulate Current Output	25
4-10	Display Cycle Configuration	26
7-1	Resistance vs. Temperature	30
8-1	Simulate Conductivity Input	35

LIST OF TABLES

Table No.	Title	Page
3-1	Key Description	14
3-2	Information Mnemonics	15
3-3	Set Function Mnemonics	15
4-1	Configuration Work Sheet	18
4-2	Relay States for Various Conditions and Alarm/Default Configurations	23
8-1	Fault Mnemonics	31
8-2	RTD Resistance Values	31
8-3	Troubleshooting Guide	34

SECTION 1.0
DESCRIPTION AND SPECIFICATIONS

- TWO CELL INPUTS OR TEMPERATURE ASSIGNABLE TO TWO ISOLATED OUTPUTS.
- ACCURATE TEMPERATURE COMPENSATED AND RAW READINGS for high purity water.
- UP TO 200 FEET (61m) SENSOR CABLE LENGTH (to 500 ft with extra shielding).
- THREE ASSIGNABLE RELAYS for process variable, temperature, or diagnostics.
- DISPLAY CAN AUTO CYCLE CELL 1 AND 2.
- NEMA 4X (IP65) ENCLOSURE.
- SECURITY CODE CAPABILITY.

1.1 FEATURES AND APPLICATIONS

The Model 1054B Microprocessor Analyzers, with the appropriate sensors, are designed to continuously measure and control pH, ORP, conductivity, resistivity, ratio, percent concentration, dissolved oxygen, ozone or total free chlorine in industrial and municipal processes.

The Model 1054B Dual Conductivity/Resistivity Analyzer offers the flexibility of one model for measurement of two cell inputs with two assignable outputs of conductivity, resistivity and/or temperature. The analyzer is housed in a NEMA 4X (IP65) weatherproof, corrosion-resistant, flame retardant enclosure suitable for panel, pipe or wall mounting. All functions are accessed through the front panel membrane keyboard which features tactile feedback. The display indicates the process variable values in engineering units as well as temperature, alarm status, hold output and fault conditions.

The 1054B DC can transmit two independent, isolated current outputs which are continuously expandable over the measurement range. Output dampening of 0-255 seconds is user selectable.

The output and relay default settings are user selectable for hold or fault mode operation. The hold output function allows manual control during routine sensor maintenance.

Continuous self diagnostics alert the operator to faults due to analyzer electronics, integral RTD failures, open wiring and process variable range problems. In the event of a fault condition or hold mode diagnosed by the analyzer, the output will be set to a preset or last process value and the relays will be set to their default settings.

Three alarms are a standard feature on the Model 1054B DC and are programmable for either high or low operation. Alarm 2 may be programmed as a fault or process variable alarm. Alarm 3 may be configured as a temperature alarm only. All alarms feature independent setpoints, adjustable hysteresis and time delay action. The time delay is convenient when an alarm is used for corrective action, such as shutting down a demineralizer for regeneration. Time delay will ignore a temporary breakthrough and prevent shutting down a demineralizer unit prematurely.

Automatic temperature compensation is standard. The process temperature is accurately measured by an integral RTD in the sensor assembly, either a PT100 or PT1000, which is automatically recognized by the analyzer. The temperature(s) can be displayed in either °C or °F. For greater accuracy, the temperature indication may be standardized to the process temperature.

Calibration is easily accomplished by entering the cell calibration constant (shown in the sensor tag) via the analyzer keypad. Standardization can also be made with the cell in process of known conductivity (resistivity).

Analyzer settings may be protected against accidental or unauthorized changes by a user selectable security code.

The **Model 1054B DC Dual Cell Analyzer** measures conductivity and/or resistivity in conventional and ultrapure water applications. This time tested technology has been applied successfully to demineralizer, reverse osmosis, and distillation applications for decades.In this single analyzer, true temperature compensation for monitoring water containing trace mineral contaminants is software selectable among the following:

1. Compensation for pure water contaminated with trace amounts of sodium chloride (standard).
2. Cation compensation for power plant applications containing ammonia or amines. Cation compensation may also be used in semiconductor etch rinse applications where the rinse water contains traces of acids.
3. Uncompensated conductivity for applications such as required by United States Pharmacopeia 23 (USP 23) specifications. The analyzer can output temperature separately for this application. NIST traceable calibration certificates are available (consult factory).

The analyzer may be used with sensors having cable length of up to 200 ft (61 m). The cable length may be up to 500 ft (152m) with extra shielding (contact factory).

1.2 PHYSICAL SPECIFICATIONS -GENERAL

Enclosure: Black ABS, with interior conductive coating, NEMA 4X, IP65, CSA Enclosure 4, 144 X 144 X 192 mm (5.7 X 5.7 X 7.6 in.)

Front Panel: Membrane keyboard with tactile feedback and user selectable security.

Digital Display: Code 01 - Black on grey LCD

Code 02 - Red LED

Character Height: 18mm (0.7 in.)

Electrical Classification:

FM Class I, Div. 2, Group A thru D
Relays: 28 Vdc relays - 5.0 amps resistive only
150 mA - Groups A & B; 400 mA - Group C;
540 mA - Group D; Ci = 0; Li = 0
CSA Class I, Div. 2, Group A thru D
Relays: 28 Vdc, 110 Vac & 230 Vac
5.0 Amps resistive only

Power: 100 - 127 VAC, 50/60 Hz ± 6%, 4.0 W
200 - 253 VAC, 50/60 Hz ± 6%, 4.0 W

Current Output: Isolated, 0-20 mA or 4-20 mA into 600 ohms maximum load at 115/230 Vac *or* 550 ohms maximum load at 100/200 Vac, direct or reverse, Output Dampening: 0-255 sec

Operating Temperature: -10 to 65°C (14 to 149°F)

Storage Temperature: -30 to 85°C (-22 to 185°F)

EMI/RFI: EN50081-2
EN50082-2 CE

LVD: EN61010-1

Ambient Humidity: LED max 95% RH (LCD max 85% RH @ 50°C)

Alarms: Three. Independently field selectable: High or Low. Alarm 3 is a temperature alarm only. Alarm 2 configurable as a process or fault alarm. Time Delay 0 to 254 seconds. Setpoints are continuously adjustable. Hysteresis is adjustable up to 25% full scale for low side/High Alarm and high side/Low Alarm

Relay Contacts: Epoxy Sealed Form A contacts, SPST, Normally open

	Resistive	Inductive
28 VDC	5.0 Amps	3.0 Amps
115 VAC	5.0 Amps	3.0 Amps
230 VAC	3.0 Amps	1.5 Amps

Weight/Shipping Weight: 1.1 kg/1.6 kg (2.5 lb/3.5 lb)

1.3 ANALYZER SPECIFICATIONS @ 25°C

Measurement Range: 0-20,000 µS/cm or 0-50.00 megohms-cm

Output Scale: Any range within measurement

Measurement Accuracy:

Conductivity Range:
- 2.0 to 2,000 µS-cm ±0.5% of reading and ±0.01 µS-cm
- 1.0 to 5,000 µS-cm ±1.0% of reading and ±0.05 µS-cm
- 0.2 to 20,000 µS-cm ±2.0% of reading and ±0.02 µS-cm

Resistivity: ±0.2 megohms-cm temperature corrected resistivity to 25°C

Temperature Accuracy: ±.1°C (0-100°C), ±.2°C (0-100°C) for cable lengths over 50 ft.

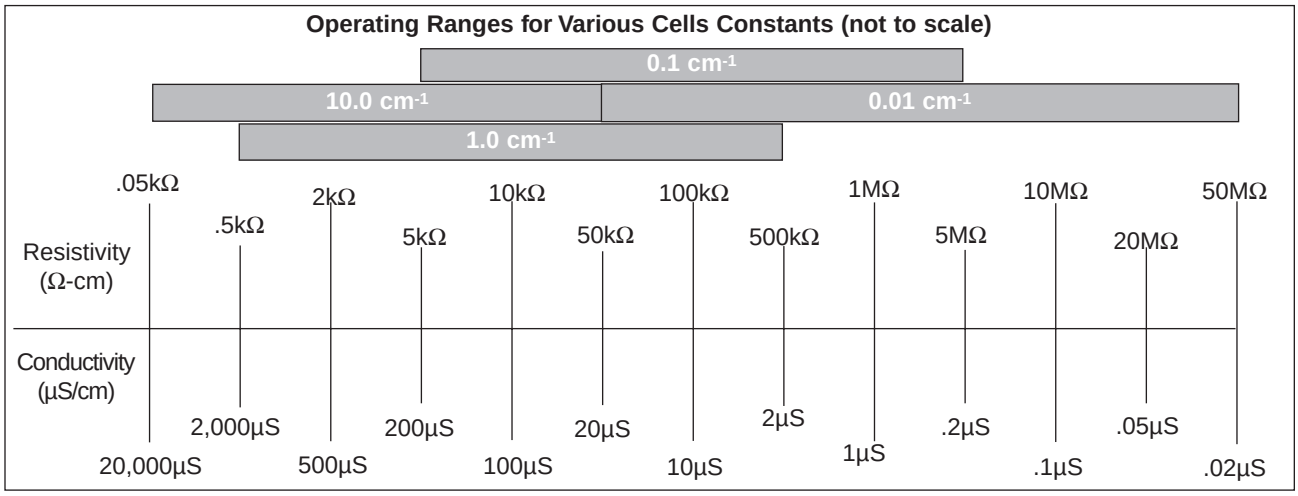
Temperature Resolution: 0.1°C

Stability: ±0.25% of output range/month, non-cumulative

Temperature Compensation: 0 to 100°C (32 to 212°F) Neutral salt or Cation

Temperature Measurement: 0-135°C

Operating Ranges for Various Cells Constants (not to scale)



OPERATING RANGES		
Cell Constants (cm^{-1})	Conductivity Range	Resistivity Range[2]
0.01	.02µS/cm to 20µS/cm	.05M to 50M
0.1	0.2µS/cm to 200µS/cm[1]	5 k to 5M[1]
1.0	2µS/cm to 2000µS/cm[1]	.5 k to 500k[1]
10.0	20µS/cm to 20,000µS/cm[1]	.05 k to 50k[1]

NOTE:

1.The notation k represents k-ohms. The notation M represents megohms. 1000Ω = 1kΩ. 1000 kΩ = 1 MΩ.

2. Ranges are given in absolute (non-temperature compensated) conductivity and resistivity.

CELLS FOR MODEL 1054B DC		
Model	Description	Cell Const cm^{-1}
400-11/400VP-11	Screw-in	0.01
400-11-36/400VP-11-36	Screw in with 6 in. insertion	0.01
400-11-50	Screw in with 50 ft. cable	0.01
451	Dip cell	0.01
455, 404-11	Flow cell, stainless steel	0.01
PD-441	Flow cell, plastic	0.01
IB-441	Plastic ball valve cell	0.01
IB(SS)-441, 402-11	Ball valve cell, stainless steel	0.01
460, 403-11-20/403VP	1-1/2 in. Sanitary fitting	0.01
456, 403-11-21/403VP	2 in. Sanitary fitting	0.01
400-12	Screw in cell	0.1
452	Dip cell	0.1
461, 404-12	Flow cell	0.1
IB(SS)442, 402-12	Ball valve cell, stainless steel	0.1
400-13/400VP-13	Screw-in cell	1.0
453A	Dip cell	1.0
402-13, IB(SS)-443A	Ball valve cell, stainless steel	1.0
401-14	Screw-in cell	10.0
454	Dip cell	10.0
402-11, IB(SS)-444	Ball valve cell, stainless steel	10.0

1.4 ORDERING INFORMATION

The **Model 1054B Dual Cell Microprocessor Analyzer** is housed in a corrosion resistant, weatherproof enclosure and operates on either 115 or 230 VAC, 50/60 Hz power. Standard features include two independent conductivity or resistivity inputs, two isolated current outputs, three alarms, and automatic temperature compensation.

MODEL 1054B	**MICROPROCESSOR ANALYZER** (3.5 lb/1.5 kg)
Code	Measurement
DC	Dual Cell Conductivity/Resistivity

Code	Display
01	LCD Display
02	LED Display

1054B DC 01 EXAMPLE

1054B DC REPLACEMENT PARTS AND ACCESSORIES	
PN	**ACCESSORIES**
2001492	Tag, Stainless Steel, Specify Marking
23053-00	Mounting Bracket, 2-inch Pipe
PN	**REPLACEMENT PARTS**
22966-00	PCB, LCD, Digital Display
23025-01	Panel Mounting Kit
23695-20	Keyboard Overlay, LCD Version
23695-21	Keyboard Overlay, LED Version
23744-00	PCB, Motherboard
23705-01	PCB, CPU, Dual Cell
23739-00	PCB, Power Supply
32937-00	Gasket Rear Cover
32938-00	Gasket Front Cover
33469-00	Enclosure Body
33470-00	Enclosure, Rear Cover
9100157	Fuse, .10A, 3AB, 250V, Slo-Blow
9100160	Fuse, .250A, 125V
9100189	Fuse, .755A, 125V

SECTION 2.0
INSTALLATION

2.1 GENERAL. This analyzer's enclosure is suitable for outdoor use. However, it should be located in an area where temperature extremes and vibrations are minimized or absent. Installation must be performed by a trained technician.

2.2 UNPACKING AND INSPECTION. Inspect the analyzer for shipping damage. If damaged, notify the carrier immediately. Confirm that all items shown on the packing list are present. Notify Rosemount Analytical if items are missing.

2.3 MECHANICAL INSTALLATION. Select an installation site that is at least one foot from any high voltage conduit, has easy access for operating personnel, and is not in direct sunlight. Mount the analyzer as follows:

1. Remove the four screws that secure the rear cover of the enclosure.
2. Remove the four screws holding the front panel assembly of the enclosure and carefully pull the front panel and connected printed circuit boards straight out.
3. Follow the procedure for the appropriate mounting configuration: Section 2.3.1 for panel mounting and Section 2.3.2 for pipe mounting.

2.3.1 Panel Mounting (Standard). The Model 1054B is designed to fit into a DIN standard 137.9 mm X 137.9 mm (5.43 inch X 5.43 inch) panel cutout (Refer to Figure 2-1 and Figure 2-2).

1. Prepare the analyzer as described in Section 2.3.
2. Install the mounting latches as described in Figure 2-2 (latches are shown oversize for clarity). If the latches are not installed exactly as shown, they will not work correctly. The screws provided are self-tapping. Tap the screw the full depth of the mounting latch (refer to side view) leaving a gap greater than the thickness of the cutout panel.
3. Align the latches as shown and insert the analyzer enclosure through the front of the panel cutout. Tighten the screws for a firm fit. To avoid damaging the mounting latches, do not use excessive force.
4. Replace the front panel assembly. Circuit boards must align with the slots on the inside of the enclosure. Replace the door and four front panel screws.

2.3.2 Pipe Mounting (PN 23053-00). The 2 in. pipe mounting bracket includes a metal plate with a cutout for the analyzer (Refer to Section 2.3 for mounting the analyzer into the plate). Mounting details are shown in Figure 2-3.

2.4 ELECTRICAL WIRING. The Model 1054B has three conduit openings in the bottom rear of the analyzer housing which will accommodate 1/2 inch conduit fittings. From the front view, the conduit opening on the left is for sensor wiring; the center is for signal output and the opening on the right is for alarm, and AC connections. Sensor wiring should always be run in a separate conduit from power wiring. AC power wiring should be 14 gauge or greater.

NOTE

For best EMI/RFI protection the output cable should be shielded and enclosed in an earth grounded rigid metal conduit. When wiring directly to the instrument connect the output cable's outer shield to the transmitter's earth ground via terminal 8 on TB3 (Figure 2-4). The sensor cable should also be shielded. When wiring directly to the instrument connect the sensor cable's outer shield to the transmitter's earth ground via terminal 8 on TB-2 (Figure 2-4). If the sensor cable's outer shield is braided an appropriate metal cable gland fitting may be used to connect to braid to earth ground via the instrument case.

The user must provide a means to disconnect the main power supply in the form of circuit breaker or switch. The circuit breaker or the switch must be located in close proximity to the instrument and identified as the disconnecting device for the instrument

2.4.1 Power Input Wiring. The Model 1054B can be configured for either 115 VAC or 230 VAC power.

Connect AC power to TB1-8 and -9 (115 VAC) or TB1-7 and -8 (230 VAC) ground to the ground terminal at TB3-8 (refer to Figure 2-4).

CAUTION

The sensitivity and stability of the analyzer will be impaired if the input wiring is not grounded. DO NOT apply power to the analyzer until all electrical connections are verified and secure. The following precautions are a guide using UL 508 as a safeguard for personnel and property.

1. AC connections and grounding must be in compliance with UL 508 and/or local electrical codes.
2. The metal stiffener is required to provide support and proper electrical continuity between conduit fittings.
3. This type 4/4X enclosure requires a conduit hub or equivalent that provides watertight connect, REF UL 508-26.10.
4. Watertight fittings/hubs that comply with the requirements of UL 514B are to be used.
5. Conduit hubs are to be connected to the conduit before the hub is connected to the enclosure, REF UL 508-26.10.
6. If the metal support plate is not used, plastic fittings must be used to prevent structural damage to the enclosure. Also, appropriate grounding lug and awg conductor must be used with the plastic fittings.

2.4.2 Output Wiring. The signal output and alarm connections are made to terminals 1 – 6 of TB1 and TB3 1 – 4. (Refer to Figure 2-4).

2.4.3 Sensor Wiring. See Figure 2-5.

2.5 SENSOR INSTALLATION.

The Model 1054B DC is designed to work with 400 Series, 140 Series, and 150/160 sensors. Refer to Figure 2-4 and Figure 2-5 for sensor wiring. Wire colors are: BLACK is CELL-1/2 TB2-1/5: WHITE is GROUND TB2-2/6: RED is RTD-1/2 TB2-3/7.

2.5.1 Cell Location. A mounting location should be chosen to meet the following considerations:

1. Avoid dead ends or pipe stubs or any location where circulation might be poor.
2. If velocity is very low, mount the cell so that the stream is directed against the end of the electrodes and the water will flow between the electrodes.
3. Be sure that the pipe is full of water and that the cell is completely immersed up to the pipe threads.
4. Cell mounting vertically downward is not recommended due to possible air entrapment.

2.5.2 Screw-in Cell Installation. The conductivity cells should be screwed gently into a female pipe fitting using a parallel jaw wrench. Threads of stainless steel should be coated with a suitable pipe compound which will act to seal the treads, and prevent the need for overtightening. Teflon thread tape is recommended for this purpose. After the cell is installed, the cell cable should be supported in such a way as to reduce strain and minimize the danger of the cable becoming snagged and pulled from the cell.

2.5.3 Flow Through Cell Installation. The flow through cells are provided with 1/4" Swagelok™ tube fittings. These are suitable for direct insertion into 1/4" O.D. sample lines. If connection to the plastic tubing is desired, the Swagelok™ fittings may be removed and replaced with 1/4" FPT - hose barb fittings. Fitting threads should be coated with a suitable pipe compound which will act to seal the treads, and prevent the need for overtightening. Teflon thread tape is recommended for this purpose. After the cell is installed, the cell cable should be supported in such a way as to reduce strain and minimize the danger of the cable becoming snagged and pulled from the cell.

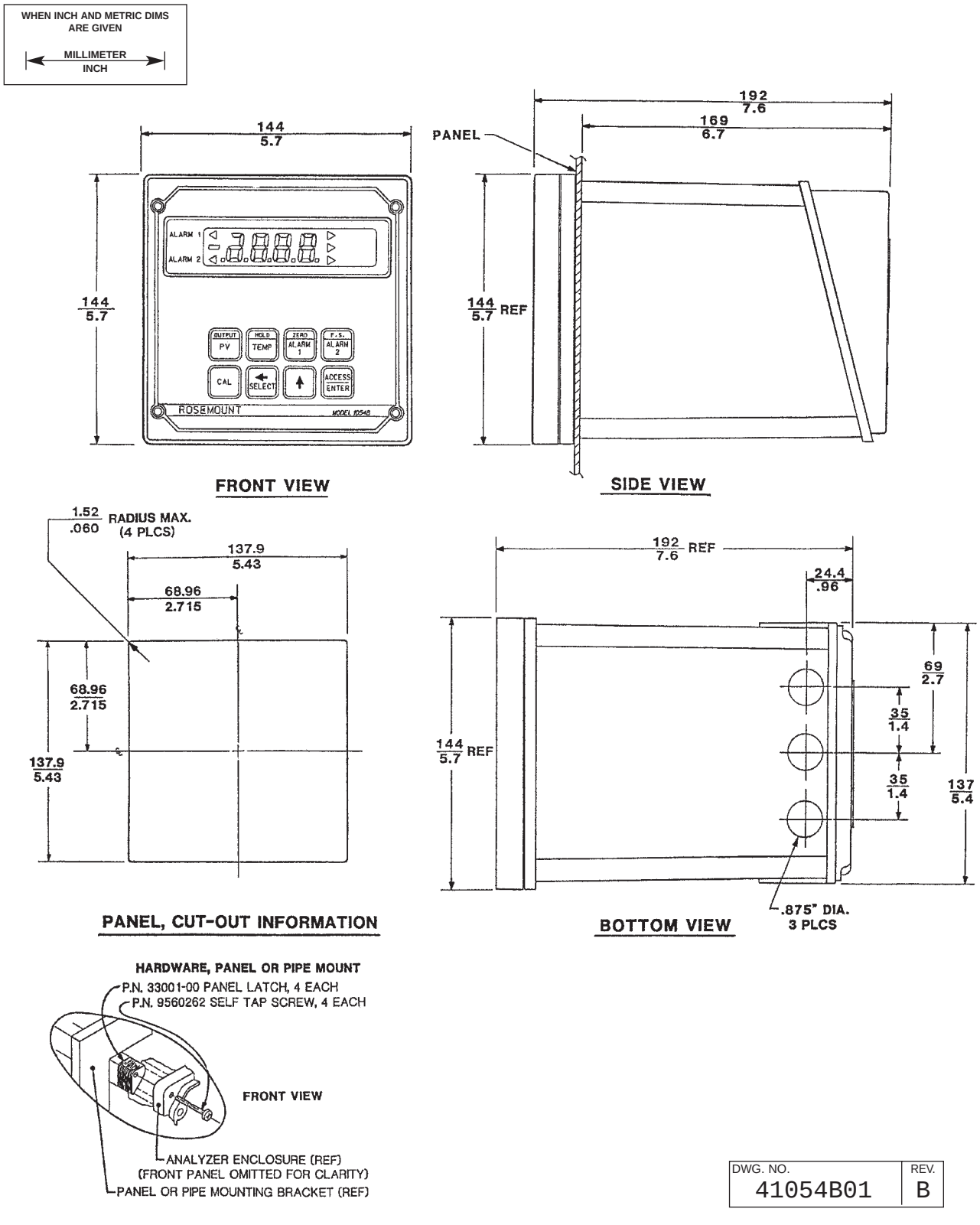
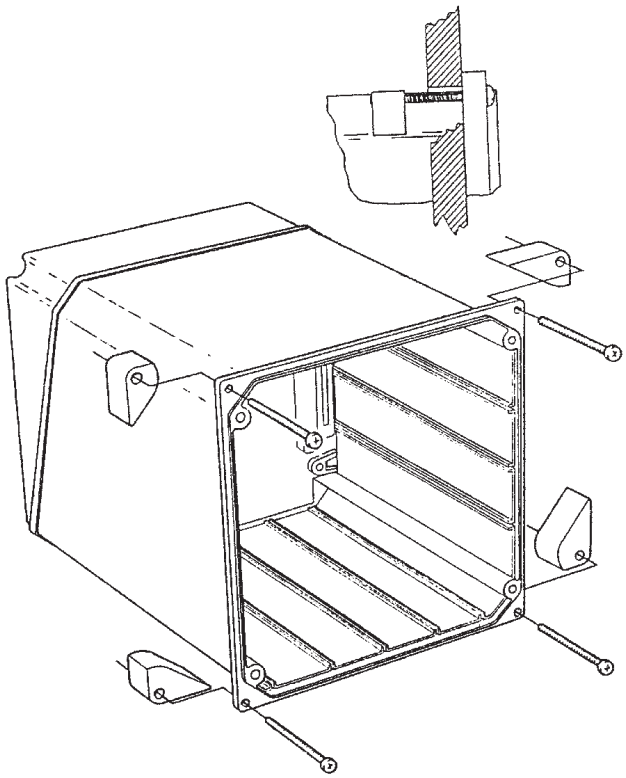


FIGURE 2-1. Panel Mounting Cutout



DWG. NO.	REV.
41054A26	A

FIGURE 2-2. Panel Mounting Tab Installation

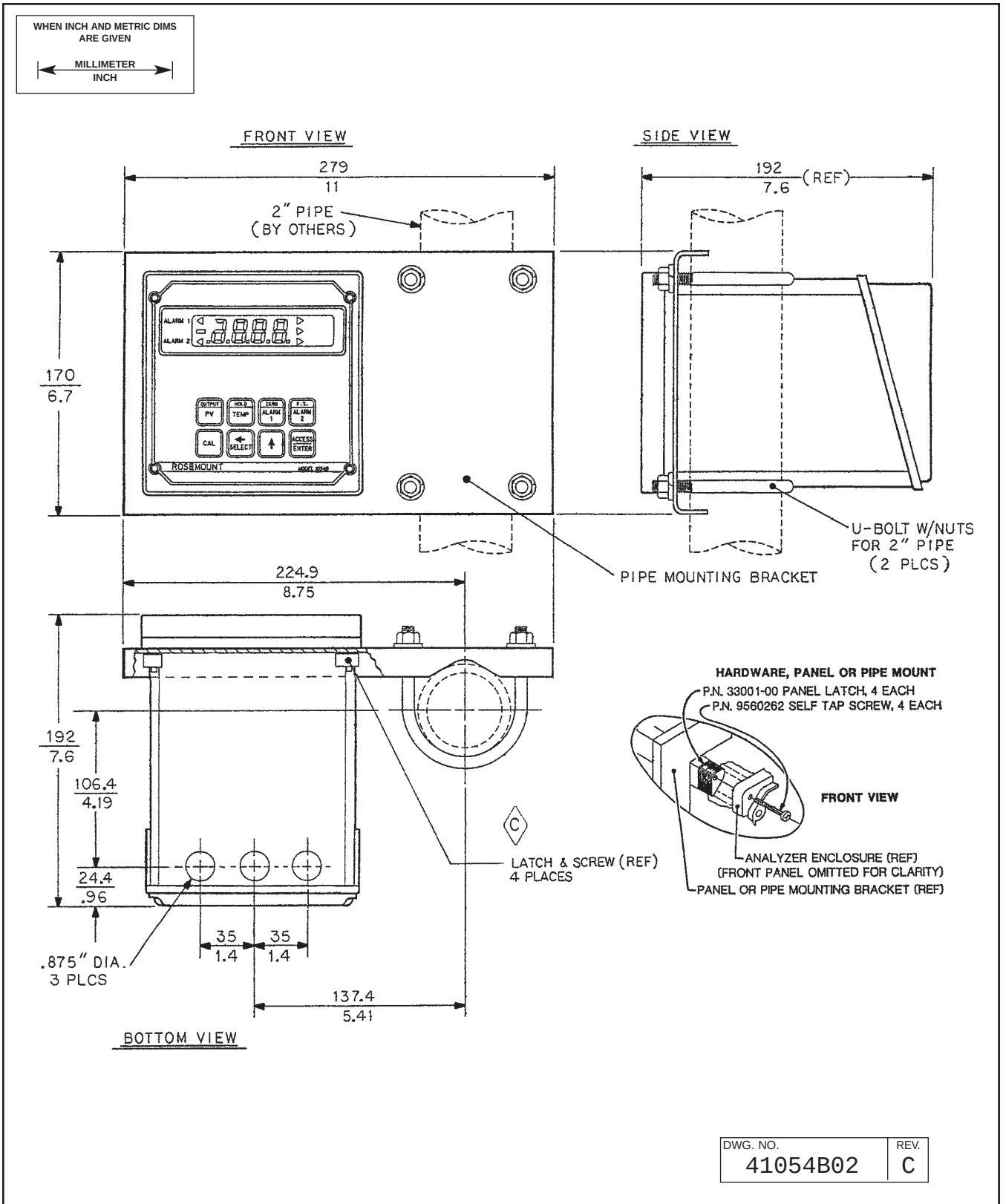
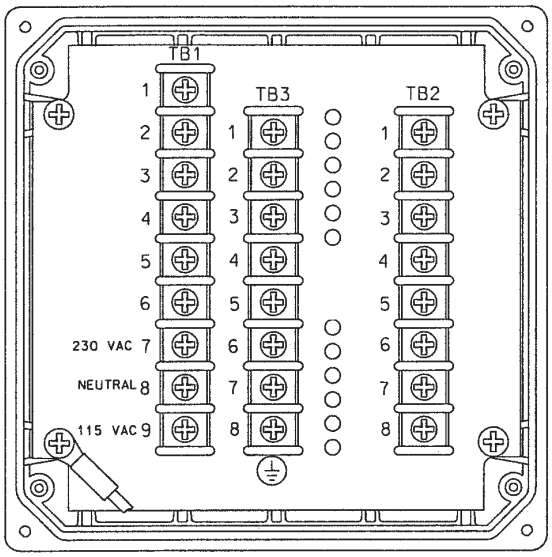
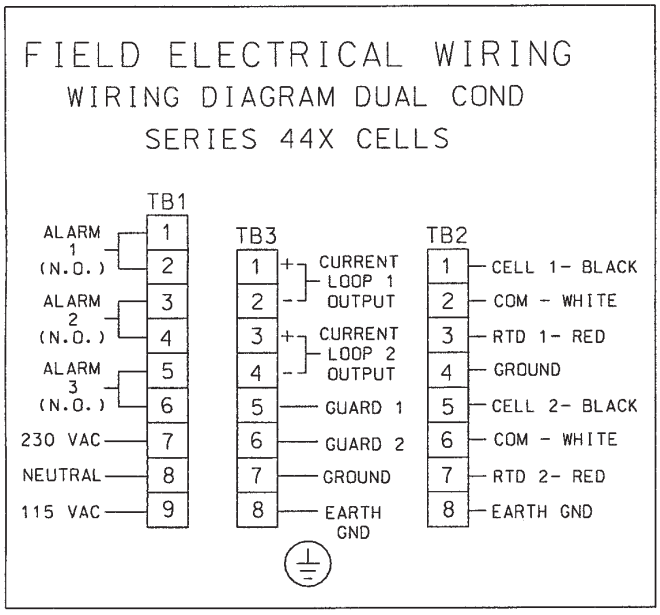
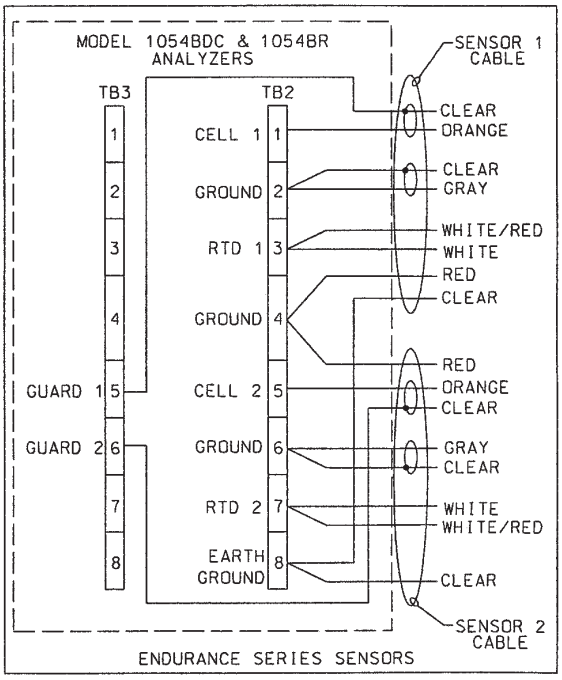


FIGURE 2-3. Pipe Mounting Installation



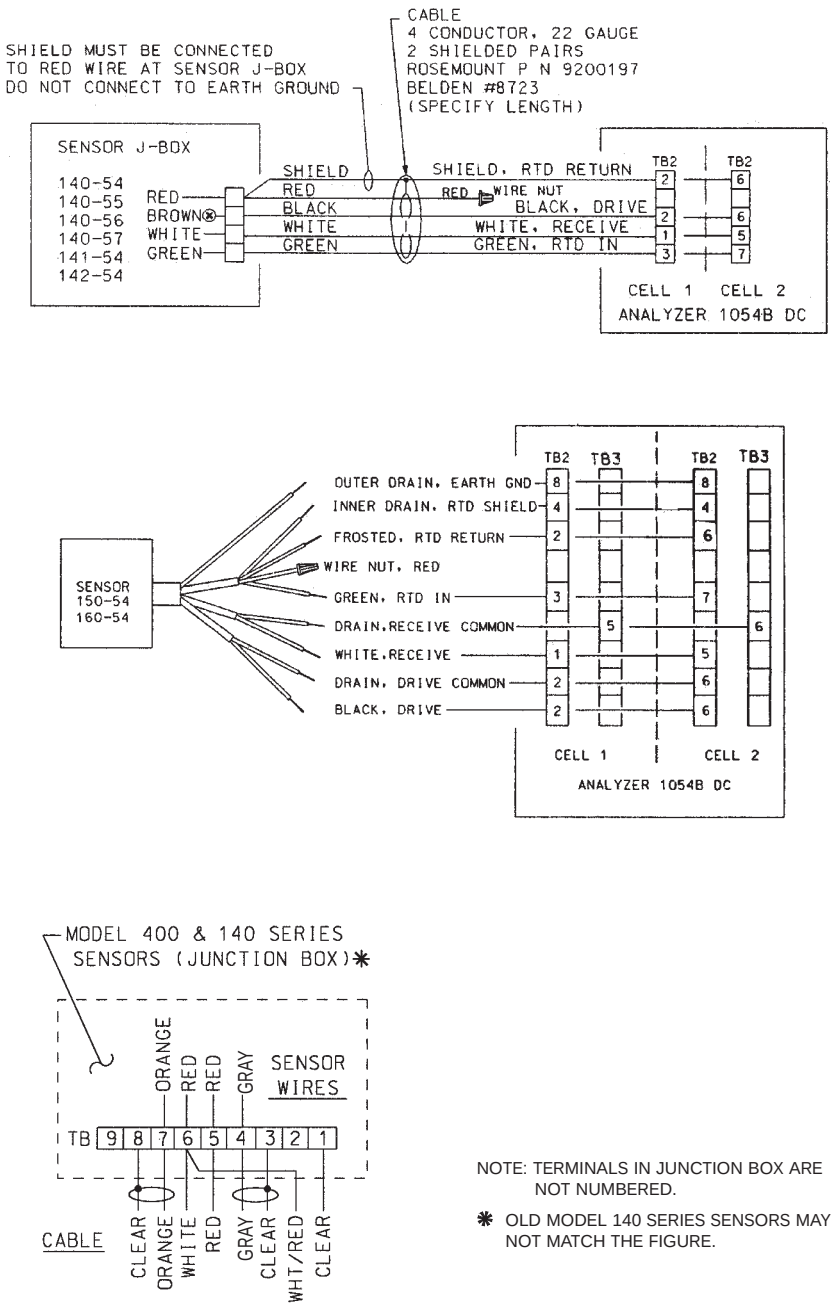
BACK VIEW / COVER OMITTED





DWG. NO.	REV.
41054B46	A

FIGURE 2-4. Electrical Wiring



NOTE: TERMINALS IN JUNCTION BOX ARE NOT NUMBERED.

* OLD MODEL 140 SERIES SENSORS MAY NOT MATCH THE FIGURE.

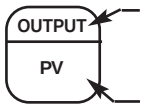
FIGURE 2-5. Sensor Wiring

SECTION 3.0
DESCRIPTION OF CONTROLS

3.1 KEYBOARD FUNCTIONS. All operations of the Model 1054B microprocessor Analyzer are controlled by the 8 keypads on the front of the instrument. These keypads are used to :

1. Display parameters other than the primary parameter.
2. Edit setpoints for alarms, set up specific output current value for simulation, calibrate temperature, conductivity, etc.
3. Configure display for temperature units, for automatic temperature compensation, alarm usage, setting timer functions, security, and output range.

To view, and not change parameters, other than the primary parameter requires only a simple keystroke routine. As shown in Figure 3-1, a single keystroke accesses the lower function printed on the keypad. Quick, double keypresses access the top function printed on the keypad.



Quick double press will access the current output value in mA or %. Read only.

Single press of the keypad will access the process variable. Read only.

FIGURE 3-1. Function Select on Keypad.

To edit any of these parameters, requires one more operation. After displaying the value associated with the parameter selected, press the **SELECT** keypad seen in Figure 3-2. This will display the numerical value, and the first digit will be flashing to indicate this value may be edited.

All changes to the operating program that set-up the instrument display are made through the set menu program. See Figure 3-5 at the end of this section.

1 .Press Key twice.
2. Lo shows briefly.
3. Zero point is displayed.

1. Press Key.
2. Adj shows briefly.
3. Numbers show with digit flashing.

FIGURE 3-2. Accessing Editing Function.

Configuration is all accomplished through a series of menus located within the set mode menu. To access these set mode menus the **ACCESS** keypad is pressed **TWICE** in **RAPID** succession.

1. Press twice in rapid succession.

2. See SEt on display. Confirms entry into set mode menu.

3. First menu item is displayed. Analyzer now ready to configure.

4. Use the SCROLL keypad to rotate through the available menus, select cell input 1 or 2, or scroll through digits or decimal point in adjustment mode.

FIGURE 3-3. Accessing Configuration Menus

Once inside the Set mode menu, use the **SCROLL** keypad to scroll through the menu list. When the menu desired is displayed, release the **SCROLL** keypad.

To enter the submenus press the **SELECT** keypad. If the submenu allows editing, the item will flash that can be edited. If not, use the **SCROLL** keypad to scroll through the next list of submenus. **SELECT** will enter this submenu and if it is editable, the field will flash.

To exit the menu and SAVE the new value, press the **ENTER** keypad.

To exit the menu without saving the edited value, press the PV keypad to jump out of the set menu program with out saving value. To change other parameters will require re-entering the set menu program.

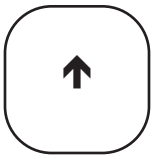
Figure 3-4 explains the various fields surrounding the primary process variable on the 1054B DC display.

Table 3-1 describes the functions accessible with the 8 keypads, the number of times to press the keypad to access, and its function when used with the select keypad and set menu.

Table 3-2 and Table 3-3 describe the meaning of the various mnemonics used on the display. They are categorized by their use in either menus, or as process information.

3.1.1 Item Selection and Value Adjustment Keys. The three keys located on the lower right side of the keypad are used for menu navigation, value adjustment and entry, and item selection. These keys perform the following functions:

A. SELECT/Shift (←) Key. This key is used to select the displayed menu, or for shifting to the next digit in the Numeric Display.



B. SCROLL Key (↑). This key is used to scroll through menu when selected, select cell input or scroll through digits on the active (flashing) Numeric Display, or move the decimal point.

C. ACCESS/ENTER Key. This key is used to **ACCESS** the Set Mode (Section 4.1.2) and to **ENTER** the displayed value into memory (from Numeric Display).

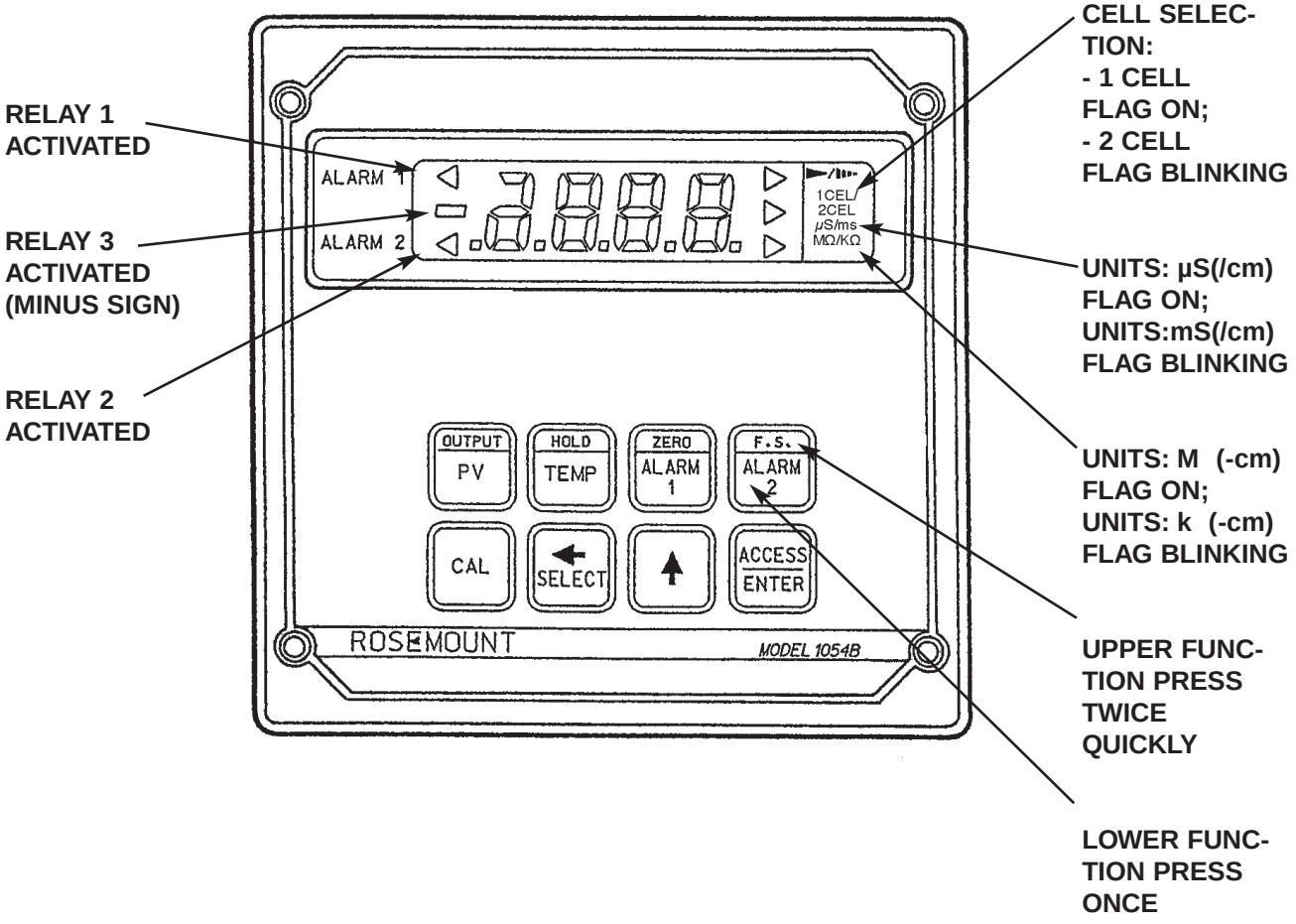


FIGURE 3-4. LCD Display

TABLE 3-1. Key Description

	MAIN FUNCTION (PRESS ONCE)	SECOND FUNCTION (PRESS TWICE QUICKLY)
OUTPUT / PV	Displays - P.V. (w/SCROLL) cell 1/2 (PV=Process Variable)	Displays - current output (mA or % full scale). Set Function (w/SELECT) - Simulates current output.
HOLD / TEMP	Displays - process temperature w/SCROLL cell 1/2 Set Function (w/SELECT) - One point standardization of temperature w/SCROLL cell 1/2	Initiates or removes analyzer from hold condition.
ZERO / ALARM 1	Displays - Alarm 1 setpoint. Set Function (w/SELECT) - Sets Alarm 1 setpoint.	Displays - low current setpoint. Set Function (w/SELECT) - Sets low current point.
F.S. / ALARM 2	Displays - Alarm 2 setpoint. Set Function (w/SELECT) - Sets Alarm 2 setpoint.	Displays - full scale output setpoint. Set Function (w/SELECT) - Sets full scale output point.
CAL	(w/SELECT) one point standardization of conductivity (w/SCROLL) cell 1 or 2	

← SELECT	Select sub menu (mnemonic display). Shift to next digit (numeric display).
↑	Select cell 1/2 input Scroll through menu (mnemonic display). Scroll digits (numeric display). Scroll decimal position, µS/mS (mΩ/kΩ) display.
ACCESS / ENTER	Press twice to access set-up menu. Enter displayed value into memory. Enter displayed menu item (flashing) into memory.

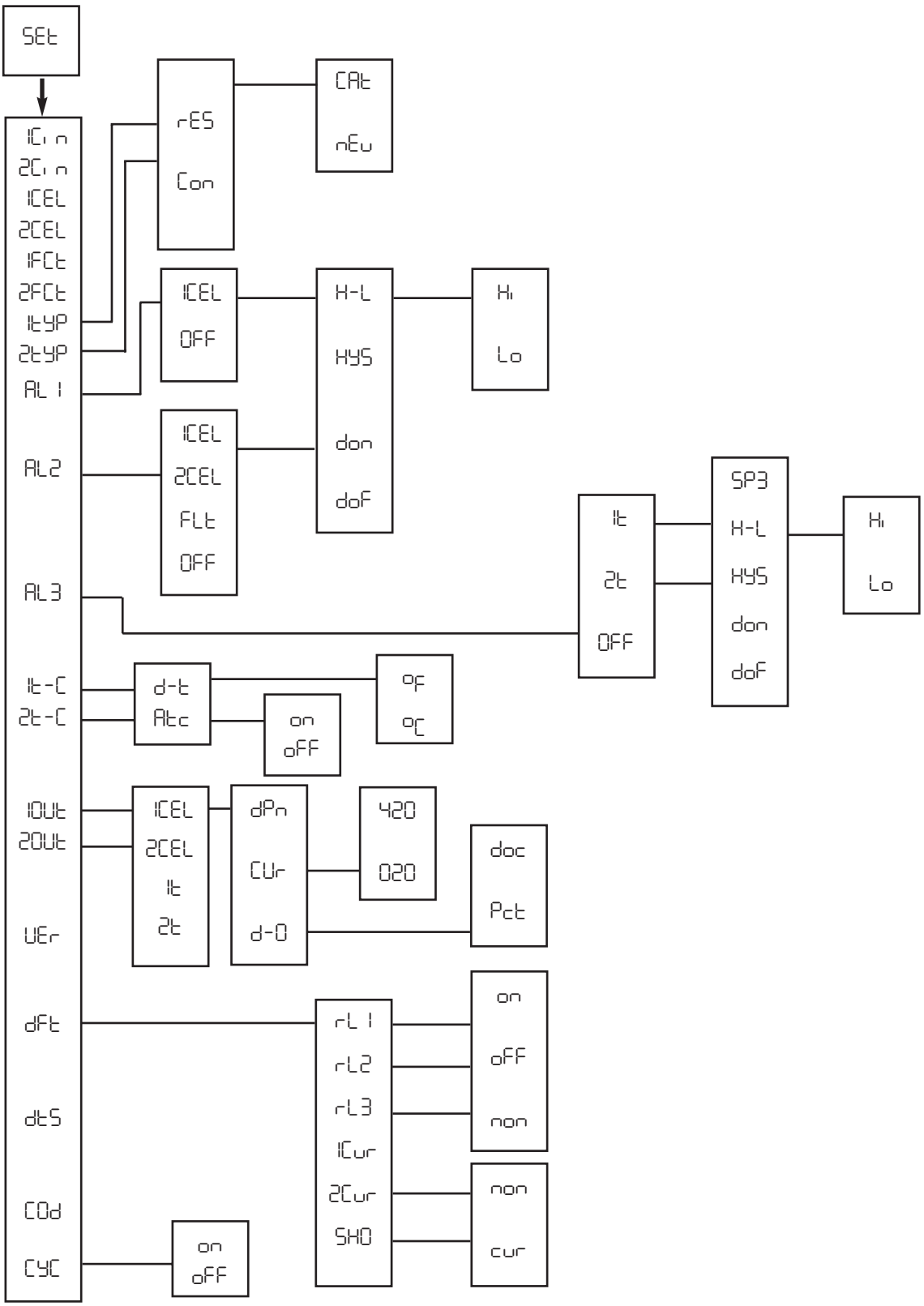
TABLE 3-2. Information Mnemonics

MNEMONIC	DESCRIPTION	MNEMONIC	DESCRIPTION
1°C	Temperature °C Cell 1	2 HI	Displays high range value for current output 2
2°C	Temperature °C Cell 2	1 LO	Displays low range value for current output 1
1°F	Temperature °F Cell 1	2 LO	Displays low range value for current output 2
2°F	Temperature °F Cell 2	LOC	Access locked – enter security code
AdJ	Adjustment to value reading	1Pct	Displays current output 1 (percent)
bAd	Incorrect entry	2Pct	Displays current output 2 (percent)
CAL	Standardize Conductivity/Resistivity	1rES	Resistivity cell 1
1Con	Conductivity Cell 1	2rES	Resistivity cell 2
2Con	Conductivity Cell 2	SEt	Set mode
1dOC	Displays current output 1 (mA)	SP 1	Displays Alarm 1 setpoint
2dOC	Displays current output 2 (mA)	SP2	Displays Alarm 2 setpoint
HLd	Analyzer in Hold Position		
1 HI	Displays high range value for current output 1		

TABLE 3-3. Set Function Mnemonics

420	4mA to 20mA output	dFt	Fault Configuration	OFF	Alarm not used
020	0mA to 20mA output	d-O	Display output	on	Relay closed on fault
AL 1	Alarm 1 setup	doc	Display output in mA	On	Use alarm as process alarm
AL2	Alarm 2 setup	doF	Delay off time	1 OUt	Current output 1 config.
AL3	Alarm 3 setup	don	Delay on time	2 OUt	Current output 2 config.
Atc	Auto. Temp. Comp.	dPn	Dampen output	Pct	Display output in percent
°C	Degrees Centigrade	d-t	Temperature display setup	rES	Resistivity Convention
CAt	Cation Compensation	dtS	LCD/LED Display test	rL 1	Relay 1 fault setup
1CEL	Cell Constant - Cell 1	°F	Degrees Fahrenheit	rL2	Relay 2 fault setup
2CEL	Cell Constant - Cell 2	1Fct	Calibration Factor - Cell 1	rL3	Relay 3 fault setup
1C, n	Absolute Conductivity Cell 1	2Fct	Calibration Factor - Cell 2	SP3	Setpoint for alarm 3
2C, n	Absolute Conductivity Cell 2	FLt	Use alarm as fault alarm	SHO	Show fault history
COd	Security Code	Hi	Relay action - high	1 t	Select 1 cell temperature
Con	Conductivity Display	H-L	Alarm logic	2 t	Select 2 cell temperature
CUr	Config. current output	HYS	Hysteresis	1t-C	1 cell temp. setup
1Cur	Config. fault output 1	Lo	Relay action - low	2t-C	2 cell temp. setup
2Cur	Config. fault output 2	non	No action on fault	1tYP	PV setup - cell 1
cur	Default current setpoint	nEu	Neutral Salt Compensation	2tYP	PV setup - cell 2
CYC	Auto Cycle cell 1/2 display	oFF	Relay open on fault	UEr	User version

FIGURE 3-5. Set Menu Items



SECTION 4.0
CONFIGURATION

4.1 GENERAL. This section details all of the items available in the Set Mode to configure the analyzer to a specific application.

4.1.1. Configuration Worksheet. The configuration worksheet on page 18 should be filled out before proceeding with the analyzer's configuration. This sheet gives a brief parameter description, the factory setting, and a space for user setting.

4.1.2 Set Mode Display Mnemonic SEt. Most of the analyzer's configuration is done while in the Set Mode. Please refer to Figure 3-5 for the layout of all menu items. All menu variables are written to the analyzer's EEPROM (memory) when selected and remain there until changed. As these variables remain in memory even after the analyzer's power is removed, the analyzer configuration may be performed prior to installing it.

1. Power up the analyzer. Only power input wiring is required for analyzer configuration (Refer to Section 2.4.1). The analyzer's display will begin showing values and/or fault mnemonics. All fault mnemonics will be suppressed while the analyzer is in Set Mode (the fault flag will continue to blink).

2. Enter Set Mode. Pressing the **ACCESS** key twice in rapid succession will place the analyzer in Set Mode. The display will show SEt to confirm that it is in Set Mode. It will then display the first item in the set menu. The analyzer is now ready for user configuration.

NOTE:

If LOC displays, the Keyboard Security Code must be entered to access the Set Mode (Refer to Section 6.0).

3. Analyzer variables can be entered in any order. On initial configuration, however, it is recommended that the variables be entered in the order shown on the worksheet. Refer to the configuration worksheet (Table 4-1). This will reduce the chance of accidentally omitting a needed variable.

4.2 PROCESS VARIABLE. Display Mnemonic tYP1 (for cell 1) tYP2 (for cell 2). Used to select display convention of the process variable.

A. Resistivity. Display Mnemonic rES. Select this item to display resistivity values (MΩ/cm or kΩ/cm).

B. Conductivity. Display Mnemonic Con. Select this item to display conductivity values (µS/cm or mS/cm).

C. Neutral salt compensation. Display Mnemonic nEu. Accept this item to use neutral salt temperature compensation algorithm for ultra pure water with trace amounts of sodium chloride.

D. Cation Compensation. Display Mnemonic CAt. Accept this item to use cation temperature compensation algorithm.

E. Raw Conductivity (no temperature compensation)

NOTE

To set up the instrument to output raw (uncompensated) conductivity, go to Section 4.4B and set the automatic temperature compensation to oFF, and set the manual temperature to 25°C (77°F) under 1t-C (and 2t-C as desired). The analyzer will still output the actual temperature correctly if temperature is selected as the output variable. This procedure is required by *USP 23.*

TABLE 4-1.
CONFIGURATION WORKSHEET

Use this worksheet to assist in the configuration of the analyzer. Date: _____

	RANGE	FACTORY SET	USER SET
A. Process Variable Display (1tYP/2tYP)			
1. Conductivity or Resistivity (Con/rES)		Con	_____
2. Temperature Compensation (nEu/CAt)		nEu	_____
B. Alarm 1 Setup (AL 1)			
1. Alarm Configuration (1CEL/OFF)		1CEL	_____
2. High or Low (H-L) (Hi /Lo)		HI	_____
3. Hysteresis (HYS)	0-25 % of setpoint	0.00%	_____
4. Delay Time On (don)	0-255 sec.	000 Seconds	_____
5. Delay Time Off (doF)	0-255 sec.	000 Seconds	_____
C. Alarm 2 Setup (AL2)			
1. Alarm Configuration (1CEL/2CEL/FLt/OFF)		2CEL	_____
2. High or Low (H-L) (Hi /Lo)		HI	_____
3. Hysteresis (HYS)	0-25 % of setpoint	0.00%	_____
4. Delay Time On (don)	0-255 sec	000 Seconds	_____
5. Delay Time Off (doF)	0-255 sec	000 Seconds	_____
D. Alarm 3 (AL3)			
1. Alarm Configuration (1 t/2t/OFF)		1 t	_____
2. Alarm 3 Setpoint (SP3)	0 to 135°C	20°C	_____
3. High or Low (H-L) (Hi /Lo)		oFF	_____
4. Hysteresis (HYS)	0 to 25% of setpoint	0%	_____
5. Delay time on (don)	0 to 255 sec	0 Second	_____
6. Delay time on (doF)	0 to 255 sec	0 Seconds	_____
E. Temperature Setup (1t-C/2t-C)			
1. Display temperature (d-t) (°C/°F)		°C	_____
2. Automatic Temp. Compensation (AtC) (on/oFF)		on	
a. Manual temp. value (when oFF) (0 to 135°C)			
F. Current Output Setup (1OUt/2OUt)			
1. Process Variable Selection (1CEL/2CEL/ 1t/2t)		1Out: 1CEL, 2Out: 2CEL	_____
2. mA Output (CUr) (020/420)		420	_____
3. Display Current Output (d-O) (Pct/doc)		doc	_____
4. Dampen Current Output (dPn)	0-255 sec.	0 Seconds	_____
G. Default Setup (dFt)			
1. Relay 1 default (rL 1) (non/oFF/on)		non	_____
2. Relay 2 default (rL2) (non/oFF/on)		non	_____
3. Relay 3 default (rL3) (non/oFF/on)		non	_____
4. Current Output Default (1Cur/2Cur) (non/cur)		non	_____
H. Keyboard Security Setup (COd)			
1. Keyboard Security Required	001-999	_	_____
2. Keyboard Security Not Required	000	000	_____
I. Alarm Set Points			
1. Alarm 1 (SP 1)	0-20,000µS/cm (0 to 50MΩ)	50µS/cm	_____
2. Alarm 2 (SP2)	0-20,000µS/cm (0 to 50MΩ)	100µS/cm	_____
J. Current Output			
1. Zero (0 or 4 mA) (1 LO/2 LO)	Conductivity: 0-20,000µS/cm	1Lo 2 LO: 0µS/cm	_____
2. F.S. (20 mA) (1 HI /2 HI)	Resistivity: 0 to 50MΩ	1HI : 10µS/cm	
	Temperature: 0 to 135°C	2HI : 20µS/cm	

4.2.1 Process Variable Configuration (tYP 1/tYP2). Refer to Figure 4-1.

1. Enter Set Mode by pressing **ACCESS** key twice.
2. **SCROLL** (↑) until tYP 1 or tYP2 appears on the display.
3. **SELECT** to move to the next menu level. rES, or Con will display.
4. **SCROLL** (↑) to display desired item then **ENTER**. nEU or CAt will display.
5. **SCROLL** (↑) to display desired item then **ENTER**. Display will return to tYP 1 or tYP2.
6. Repeat steps 2 through 5 for 2nd cell configuration.

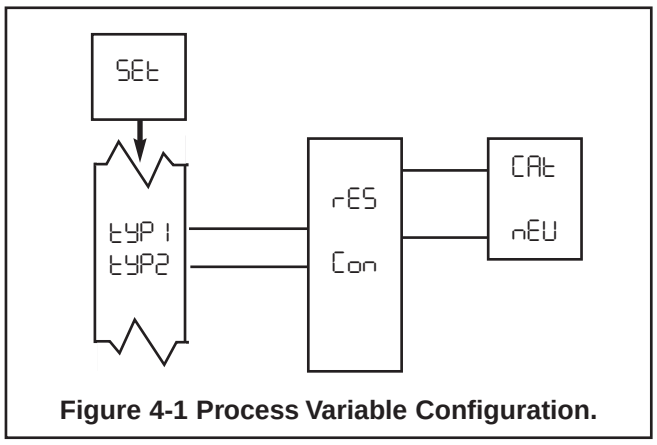


Figure 4-1 Process Variable Configuration.

4.3. ALARM 1 AND 2. Display Mnemonic AL 1 or AL2. Used to set alarm relay logic. The alarms may be used to perform on-off process control. See note below.

A. CELL 1/2. Display Mnemonic 1 CEL/2 CEL. Select this item if Alarm 1 or 2 is to be used as a process alarm. Select 1 CEL to act on Cell 1 input. Select 2 CEL to act on cell 2 input. See Steps D through G for further configuration.

B. OFF. Mnemonic OFF. Select this item if alarm 1 or 2 will not be used or to temporarily disable the alarm. Alarm 1 or 2 setpoint will display oFF if this item is selected. Omit Steps D through G.

C. Fault. Display Mnemonic FLt. (Alarm 2 only). Select to make Alarm 2 a fault alarm. Relay 2 will energize when the unit shows a fault condition. See Table 8-1 for a listing of the fault mnemonics and their descriptions. Alarm 2 setpoint will display Flt if this item is selected. Omit Steps D through G.

D. Alarm Logic. Mnemonic H-L. Select this item for high or low alarm logic. High logic activates the alarm when the reading is greater than the set point value. Low logic activates the alarm when the reading is less than the set point value.

E. Relay Hysteresis. Display Mnemonic HYS. Sets the relay hysteresis (dead band) for deactivation after reading has passed the alarm set point. May be set from 0 to 25%. Use hysteresis when a specific conductivity should be reached before alarm deactivation.

F. Delay Time On. Display Mnemonic don. Sets time delay for relay activation after alarm set point is reached. May be set from 0 to 255 seconds.

G. Delay Time Off. Display Mnemonic doF. Sets time delay for relay deactivation after alarm set point is reached. May be set from 0 to 255 seconds. Alarm state restarts time from zero. Use when a fixed time should pass before relay deactivation occurs.

4.3.1 Alarm 1 and 2 Configuration (AL 1/AL2). Refer to Figure 4-2.

1. Enter Set Mode by pressing **ACCESS** key twice.
2. **SCROLL** (↑) until AL 1 or AL2 appears on the display.
3. **SELECT** to move to the next menu level. 1 CEL, OFF or (AL2 only) 2 CEL or FLt will display.
4. **SCROLL** (↑) to display desired item then **SELECT**.

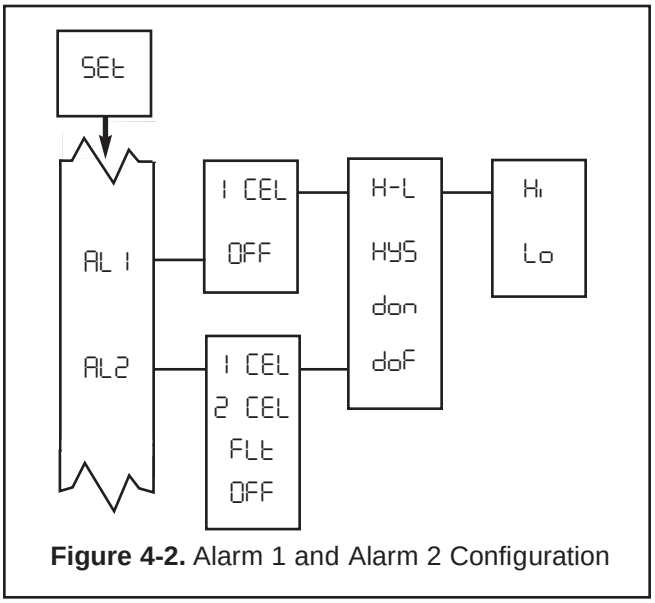


Figure 4-2. Alarm 1 and Alarm 2 Configuration

5. If OFF is selected, display will show oFF to acknowledge. Press **ENTER** key to return to AL1 or AL2, concluding routine. Skip to Step 11.

   If 1 CEL or 2 CEL is selected, display will show on to acknowledge, then display H-L. Proceed to Step 6.

   If FLt is selected, display will show Flt to acknowledge. Press **ENTER** key to return to AL2.

6. **SELECT** H-L. Hi or Lo will display (flashing).

7. **SCROLL** (↑) to the desired item and ENTER it into memory. Display will return to H-L. If changes to relay activation logic are desired, proceed to Step 8, otherwise Step 12.

8. **SCROLL** (↑) to display HYS, don or doF then **SELECT** desired item. Numerical display will flash to indicate that a value is required.

9. Use **SCROLL** (↑) and **SHIFT** (←) to display the desired value.

10. **ENTER** value into memory. The analyzer will acknowledge and return to display of last item selected. Repeat Step 8 if further changes are desired, otherwise Step 12.

11. Repeat Step 3 for the other Alarm 2 settings as required.

12. To return to the first level of the Set Mode, press the **ACCESS** key.

4.3.2 Alarm 3. Display Mnemonic AL3. Used to set alarm relay logic for relay 3 based on process temperature from cell I or 2.

NOTE

If alarm 3 is activated, the negative sign will flash on the display

A. Cell Selection. Display Mnemonic 1 t or 2t. Select this item to use the process temperature relay. Select 1t for input from cell one's RTD, 2t for input from cell two's RTD.

B. Off. Mnemonic OFF. Select this item if relay 3 will not be used.

C. Set Point. Mnemonic SP3. Select this item to enter the alarm setpoint.

D. Alarm Logic. See Section 4.3D

E. Relay Hysteresis. See Section 4.3E

F. Delay Time On. See Section 4.3F

G. Delay Time Off. See Section 4.3G

4.3.3 Alarm 3 Configuration (AL3). Refer to Figure 4-3.

1 . Enter Set Mode by pressing **ACCESS** key twice.

2. **SCROLL** (↑) until AL3 appears on display.

3. **SELECT** to move to the next menu level. 1 t, 2t or OFF will display.

4. **SCROLL** (↑) to display desired item then **SELECT.**

5. If OFF is selected, display will show OFF to acknowledge. Press **ENTER** key to return to AL3, concluding routine. Proceed to Step 13.
   If 1 t or 2 t is selected, display will go to next menu level. SP3 will display.

6. To change alarm set point, **SELECT** SP3. Current temperature setpoint will display with last digit flashing. **SCROLL** and **SHIFT** to display the desired value. Note: to change temperature display (°F or °C), refer to Section 4.4 (Temperature).

7. **ENTER** value into memory. The analyzer will acknowledge and return to display SP3.

8. **SCROLL** (↑) to display H-L, then **SELECT.** Hi or Lo will display (flashing).

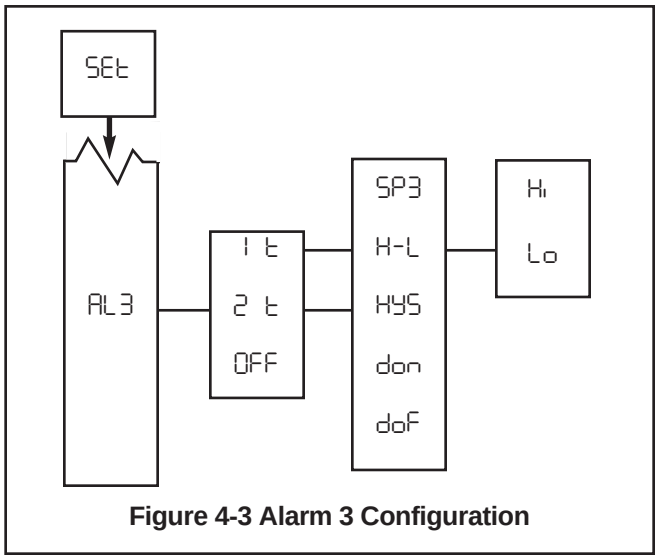


Figure 4-3 Alarm 3 Configuration

9. **SCROLL**(↑) to the desired item and **ENTER** it into memory. Display will return to H-L. If changes to relay activation logic are desired, proceed to next step. Otherwise go to Step 13.

10. **SCROLL** (↑) to display HYS, don or doF then SELECT desired item. Numerical display will flash to indicate that a value is required.

11. Use **SCROLL** (↑) and **SHIFT** (←) to display the desired value.

12. **ENTER** value into memory. The analyzer will acknowledge and return to display of last item selected. Repeat Step 10 if further changes are desired.

13. To return to the first level of the Set Mode, Press the **ACCESS** key.

4.4 TEMPERATURE. Display Mnemonic 1t-C / 2t-C. Select this item for temperature reading and compensation choices.

A. Temperature Display. Display Mnemonic d-t.
Select this item to toggle between °F and °C temperature display. The analyzer will show all temperatures for both cells in units selected until the selection is changed.

B. Automatic Temperature Compensation. Display Mnemonic Atc. The analyzer will use the temperature input from the sensor for temperature correction when on is selected. When oFF is selected, the analyzer will use the value entered by the user for temperature correction. This manual temperature option is useful if the temperature sensor is faulty or not on line, or if uncompensated (raw) conductivity will be output. Use 25°C (or 77°F) as the manual temperature in this case. Temperature specific faults will be disabled (refer to Section 8.0).

4.4.1 Temperature Configuration t-C. See Figure 4-4.

1. Enter Set Mode by pressing **ACCESS** key twice
2. **SCROLL** (↑) until 1t-C (for cell one) or 2t-C (for cell two) appears on the display.
3. **SELECT** to move to the next menu level. d-t will display.
4. **SCROLL** (↑) to display desired item then **SELECT** it.
5. If d-t is selected, display will show °C or °F. If Atc is selected, display will show on or oFF
6. **SCROLL** (↑) then **ENTER** desired item into memory.
7. If °C, °F or on are entered, display will return to the previous level (proceed to Step 9).

   If oFF is selected, numerical display will flash indicating that a process temperature value is required (proceed to Step 8).
8. Use **SCROLL** (↑) and **SHIFT** (←) to display the desired value **ENTER** value into memory
9. Repeat Steps 4-8 as required for other item
10. Press the **ENTER** key to return to Set Menu.
11. Repeat Steps 2-10 for second cell.

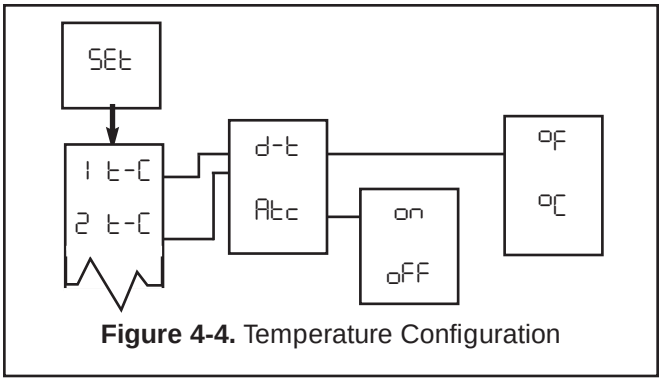


Figure 4-4. Temperature Configuration

4.5 CURRENT OUTPUT. Display Mnemonic is 1 OUt 2 OUt. These items are used to configure the output signals. Each output corresponds to a user selectable item.

A. Conductivity/Resistivity. Display Mnemonic 1CEL or 2CEL. Select 1CEL to correspond to the process variable measured by cell one, 2CEL for cell two's process variable.

B. Process Temperature. Display Mnemonic 1t or 2t. Select 1t to correspond output to temperature of cell one's process temperature, 2t for cell two's process temperature.

Operation of output is user selectable as follows:

A. Output Dampening. Display Mnemonic dPn. Dampens the response of the signal output. This option is useful to minimize the effect of a noisy reading. The number entered is the sample time (in seconds) for an averaged output. Zero to 255 seconds may be entered.

B. mA Output Range. Display Mnemonic CUr. Selection of this item will allow choice of 0 to 20 mA or 4 to 20 mA output range.

C. Display Output. Display Mnemonic d-O. This item is used to select logic of output display. Selecting this item will allow the analyzer to display current output as mA (doc) or as a percent of full scale output range (Pct).

4.5.1 Current Output Configuration 1Out / 2Out. Refer to Figure 4-5.

1. Enter Set Mode by pressing the **ACCESS** key twice.
2. **SCROLL** (↑) until 1Out 2Out appears on the display.
3. **SELECT** to move to the next menu level. The item presently in memory will display.
4. **SCROLL** (↑) then **SELECT** desired item.
5. If dPn is selected, numerical display will flash indicating that a value is required (proceed to Step 6).

   If Cur or d-0 is selected, proceed to Step 7.
6. **SCROLL** (↑) then **SHIFT** (←) to display the desired value. **ENTER** into memory
7. **SCROLL** (↑) then **ENTER** desired item.
8. Repeat Steps 4-7 as required.
9. Press the **ENTER** key to return to the Set Menu.
10. Repeat Steps 2-9 for second output configuration.

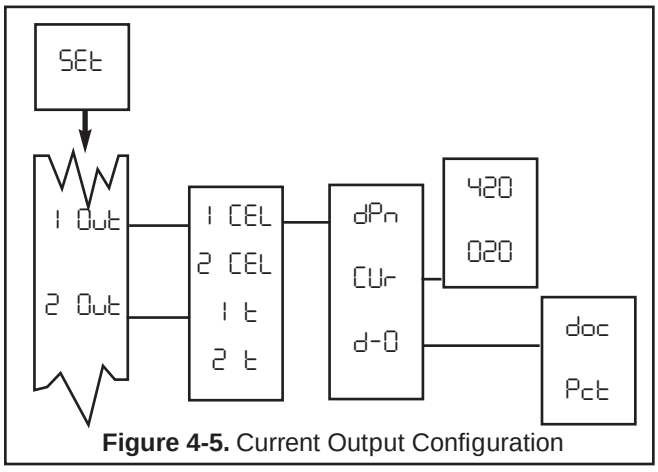


Figure 4-5. Current Output Configuration

4.6 DEFAULTS. Display Mnemonic dFt. This item is used to set the configuration of relays and output default conditions during fault or hold status. See Table 8-1 for a listing of the possible fault conditions which can be diagnosed by the analyzer. A hold status is initiated by pressing the **HOLD** key twice. (Press twice again to remove the hold.)

A. Relay 1, 2 and 3. Display Mnemonic rL 1, rL2 and rL3. The relays can be set to activate on, deactivate oFF, or hold present status non. See Table 4-2.

B. Current Output. Display Mnemonic Cur.The current output is held non or goes to a specified value cur during a fault condition. cur will probably be the most informative selection.

C. Fault History. Display Mnemonic SHO. Selecting this item will display the most recent detected faults. Press the **SCROLL** key once for each previous fault history. Pressing **ACCESS** will clear SHO history.

4.6.1 Default Configuration (dFt). dFt Refer to Figure 4-6.

1. Enter Set Mode by pressing the **ACCESS** key twice.
2. **SCROLL** (↑) until dFt appears on the display.
3. **SELECT** to move to the next menu level. rL 1 will display.
4. **SCROLL** (↑) then **SELECT** desired item.
5. Display will show next item selection. **SCROLL** (↑) and **ENTER** desired item.
6. Repeat Steps 4 and 5 as required for other default settings rL2, rL3, 1Cur and 2Cur. If cur is selected for 1Cur / 2Cur, press **ENTER** then use the **SCROLL** (↑) and **SHIFT** (←) keys to enter the desired current value in mA.
7. Press the **ENTER** key to return to Set Menu.

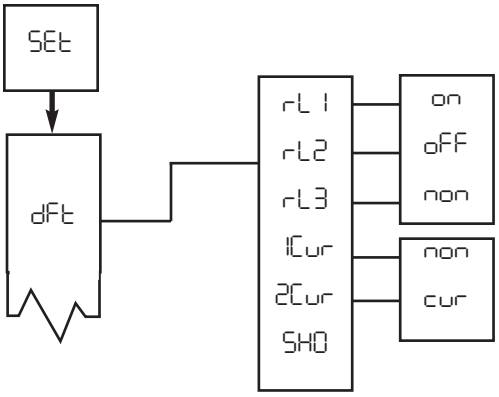


Figure 4-6. Default Configuration

4.7 ALARM SETPOINT. Alarms 1 & 2. The alarms setpoints should be adjusted after completing the configuration procedure outlined in Sections 4.1 to 4.6. (Refer to Figure 4-7).

NOTE

Alarm 3 setpoint is set under set mode. See Section 4.3.2.

1. Press the **PV** key to ensure that the analyzer is not in Set Mode.

TABLE 4-2. Relay States for Various Conditions and Alarm/Default Configurations

Set Menu default (dFt) setting rL1 rL2 rL3	ANALYZER CONDITION								
	NORMAL			HOLD			FAULT		
	Set menu AL 1/AL2/AL3 setting			Set menu AL 1/AL2/AL3 setting			Set menu AL 1/AL2/AL3 setting		
	On	OFF	FLt (Alarm 2 only)	On	OFF	FLt (Alarm 2 only)	On	OFF	FLt (Alarm 2 only)
on	Proc. det.	–	–	+	–	–	+	–	+
oFF	Proc. det.	–	–	–	–	–	–	–	+
non	Proc. det.	–	–	Proc. det.	–	–	Proc. det.	–	+

Proc. det.: Alarm state is determined by the process value.
+ : Relay will activate.
– : Relay will not activate.

Example: If you want the analyzer to activate relay 1 in hold mode during calibration, set AL 1 to On in Section 4.3, and set rL 1 to on.

2. Press the **ALARM 1** or **ALARM 2** key. SP 1 or SP2 will show briefly, followed by the Alarm 1 or Alarm 2 Setpoint.

NOTE:
If the alarm is set to OFF or FLt (Alarm 2 only), the analyzer will display oFF or Flt respectively. (Refer to Section 4.2, Alarm Configuration.)

3. Press **SELECT** to adjust the value. The display will acknowledge briefly with AdJ followed by the Numeric Display with digit flashing.

4. **SCROLL** (↑) and **SHIFT** (←) to display the desired value.

5. **ENTER** value into memory. Repeat Steps 2 to 5 for the second setpoint.

NOTE
Selection of the µS/mS and decimal position is achieved by pressing **SHIFT** (←) until the µS/mS flag flashes, then **SCROLL** (↑) until the desired combination of decimal position and mS (flashing)/µS (not flashing) flag are displayed. Follow the same procedure to select the MΩ/kΩ and decimal position.

Alarm logic may be changed from normally open (N.O.) to normally closed (N.C.) by cutting circuits (W5, W7 & W9) on the power supply PCB and adding jumpers (W4, W6, & W8).

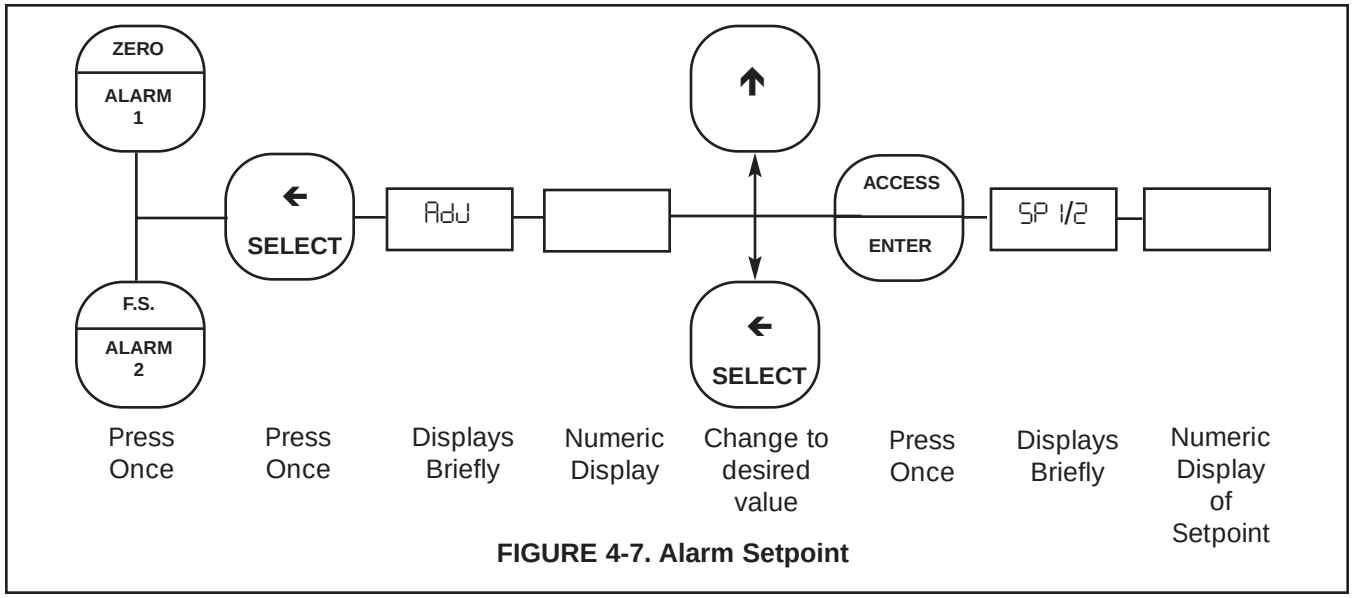


FIGURE 4-7. Alarm Setpoint

4.8 OUTPUT SCALE EXPANSION. The output is controlled as user configured. The output zero and full scale value should be adjusted after completing the configuration procedure as outlined in Sections 4.1 to 4.6. (Refer to Figure 4-8.)

A. ZERO POINT (0 mA or 4 mA) 1 LO/2 LO

1. Press the **PV** key to ensure that the unit is not in Set Mode.
2. Press the **ALARM 1** key twice. The display will show 1 LO or 2 LO briefly then display the ZERO point. Scroll (<) to toggle 1 LO/2 LO.
3. Press **SELECT** to adjust the value. The display will acknowledge briefly with AdJ followed by the Numeric Display with digit flashing.
4. **SCROLL** (↑) and **SHIFT** (←) to display the desired value.
5. **ENTER** value into memory. The display will show 1 LO/2 LO and display the entered value.
6. Repeat steps 2-5 for second output.

B. Full Scale (F.S.) Point (20 mA) 1 HI /2 HI

1. Press the **PV** key to ensure that the analyzer is not in Set Mode.
2. Press the **ALARM 2** key twice. The display will show 1 HI or 2 HI briefly then display the FULL SCALE point. **SCROLL** (<) to toggle 1 HI /2 HI .
3. Press **SELECT** to adjust the value. The display will acknowledge briefly with AdJ followed by the Numeric Display with digit flashing.
4. **SCROLL** (↑) and **SHIFT** (←) to display the desired value.
5. **ENTER** value into memory. The display will show 1 HI /2 HI and display the entered value.
6. Repeat steps 2-5 for the second output.

NOTE
For a reverse output, enter the higher value for **zero**, and the lower value for the **Full** Scale.

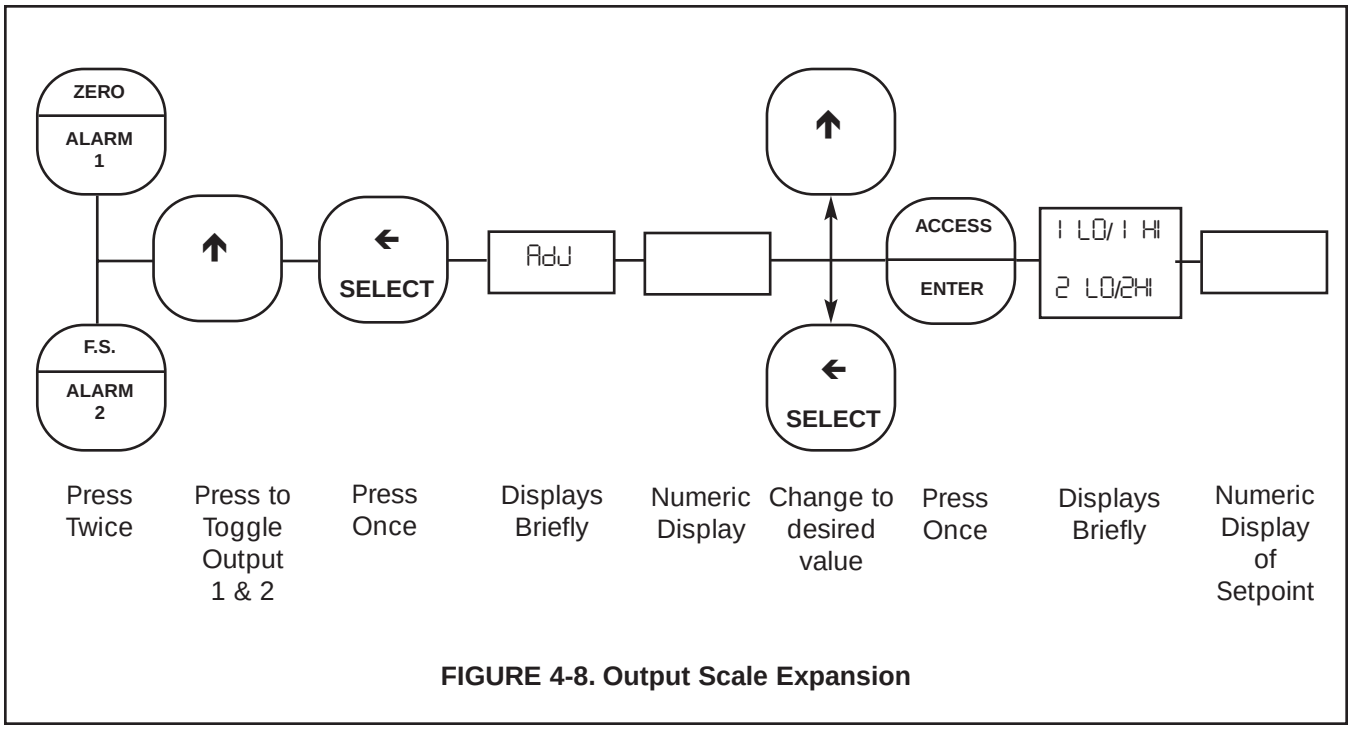


FIGURE 4-8. Output Scale Expansion

4.9 SIMULATE CURRENT OUTPUTS. The outputs can be simulated to check the operation of devices such as valves, pumps, or recorders. The outputs can be simulated in either current (mA) or percent of full scale, depending on how the output displays d-O were configured in Section 4.5. (Refer to Figure 4-9.)

A. Simulate Output in Percent 1 25.0 P. The output can be simulated in percent if d-O in Section 4.5 was configured to display percent Pct.

1. Press the **PV** key once to insure that the analyzer is not in the Set Mode.

2. Press the **OUTPUT** key twice. The display will show 1Pct or 2Pct briefly, then display the output value in percent of full scale. **SCROLL** (↑) to toggle 1Pct/2Pct.

3. Press **SELECT** to simulate the output. The display will briefly acknowledge with 1S.0 P or 2S.0 P followed by the Numeric Display with digit flashing.

4. **SCROLL** (↑) and **SHIFT** (←) to display the desired value.

5. **ENTER** value into memory. The display will show 1Pct or 2Pct and display the entered value. Also, the display will flash to acknowledge that the analyzer is placed on hold HLd. In hold mode the relays will be set as determined in Section 4.6.

6. To remove the analyzer from hold, press the **HOLD** key twice. The hold flag on the display will be removed and the display will stop flashing.

B. Simulate Output in Current 1S.0 C / 2S.0 C. The output can be simulated in mA units if d-O in Section 4.5 was configured to display current doc.

1. Press the **PV** key once to insure that the analyzer is not in the Set Mode.

2. Press the **OUTPUT** key twice. The display will show 1dOC or 2dOC briefly, then display the output value in mA. **SCROLL** (↑) to toggle 1dOC/2dOC.

3. Press **SELECT** to simulate the output. the display will briefly acknowledge with S.0 c followed by the Numeric Display with digit flashing.

4. **SCROLL** (↑) and **SHIFT** (←) to display the desired value.

5. **ENTER** value into memory. The display will show dOC and display the entered value. Also, the display will flash to acknowledge that the analyzer is placed on hold HLd. In hold mode the relays will be set as determined in Section 4.6.

6. To remove the analyzer from hold, press the **HOLD** key twice. The hold flag on the display will be removed and the display will stop flashing.

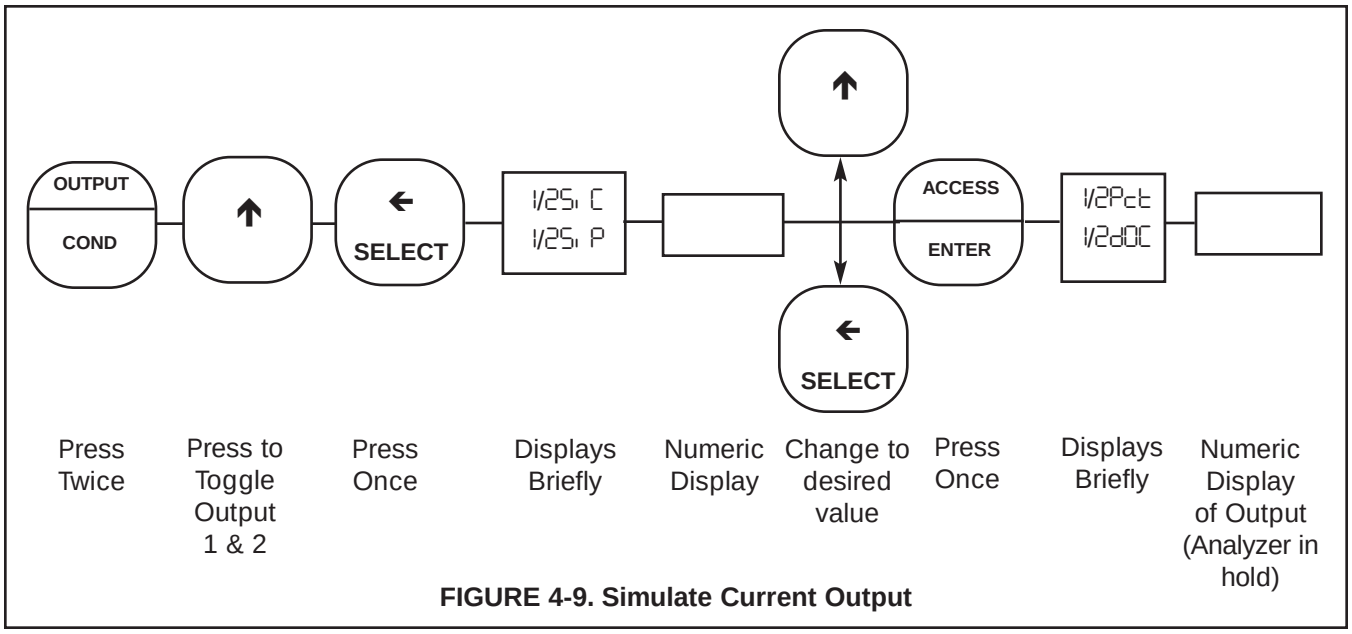


FIGURE 4-9. Simulate Current Output

4.10 DISPLAY CYCLE. Display Mnemonic CYC. This feature allows the display to alternate between cell one and cell two PV readings. Refer to Figure 4-10.

1. Enter the Set Mode by pressing the **ACCESS** key twice.

2. **SCROLL (↑)** until CYC appears on the display.

3. **SELECT** to move to next menu level. Display will flash showing present cycle mode: on or oFF

4. **SCROLL (↑)** to display desired item then **ENTER.** If oFF is entered, display will return to the previous level and the display will not cycle. If on is entered, display will show cycle time in seconds. **SCROLL (↑)** and **SHIFT(←)** to display desired value, then enter. Display will toggle between **PV** of cell one and **PV** of cell two each cycle time.

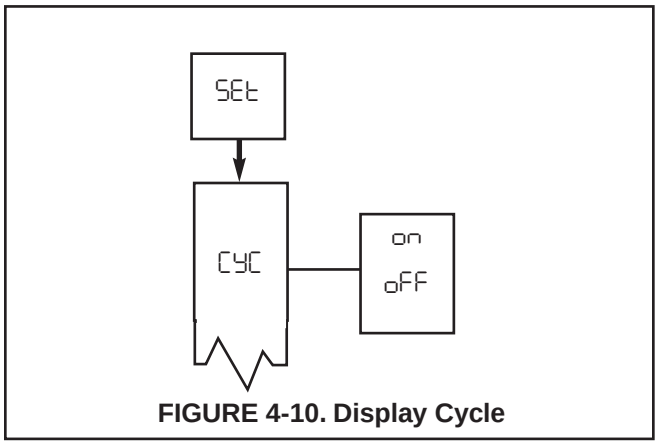


FIGURE 4-10. Display Cycle

SECTION 5.0
START-UP AND CALIBRATION

5.1 START-UP AND CALIBRATION. Calibration and operation of the Model 1054B DC should begin only after completion of configuration of the analyzer. The sensor must be wired (including junction box and interconnecting cable) as it will be in operation.

5.1.1 Entering the Cell Constant. The cell constant is factory set for a .01 cell constant. If the value is correct for both cells, proceed to Section 5.1.2. If a cell with a constant other than .01 is used, enter the appropriate value (1CEL for cell 1, 2CEL for cell 2) as follows:

l. Enter the Set Mode by pressing the **ACCESS** key twice in rapid succession. The analyzer will display SEt briefly then display 1Con.
2. **SCROLL** (↑) the menu until 1CEL or 2CEL is displayed, then **SELECT** it. The Numerical display will flash to indicate that a value is desired.
3. Use **SCROLL** (↑) and **SHIFT** (←) to display the correct sensor cell constant and **ENTER** it into memory.
4. Repeat this procedure for the second cell if required.

5.1.2 Entering the Cell Calibration Constant (Factor). Model 400 Series conductivity cells intended for use with the 1054B DC include a tag giving its calibration constant, Cal Const. This is a number between 0 and 999 specifying the cell's exact cell constant. Entering this value (1Fct for Cell 1, 2Fct for Cell 2) into the 1054B DC allows increased measurement accuracy. Enter the number provided on the Cell's tag as follows:

1. Enter the Set Mode by pressing the **ACCESS** key twice in rapid succession. The analyzer will display SEt briefly then display 1Con.
2. **SCROLL** (↑) the menu until 1Fct or 2Fctis displayed, then **SELECT** it. The Numerical display will flash to indicate that a value is desired.
3. Use **SCROLL** (↑) and **SHIFT** (←) to display the correct calibration constant and **ENTER** it into memory.
4. Repeat this procedure for the second cell if required. For Model 150,160, and 140 Series cells, perform a single point calibration (See Section 5.1.4).

5.1.3 Temperature Calibration. Precise measurement of high purity water requires accurate temperature measurement. For this reason it is recommended that the cells be temperature calibrated.

To calibrate a conductivity cell, place the cell and a high accuracy mercury thermometer into a beaker of water. It is best, though not essential, that the sample be near the temperature of the intended process stream. Allow several minutes for the sensor and thermometer to come to equilibrium.

NOTE

Pressing the Temp key will display the process temperature for Cell 1. To toggle the display for the process temperature for Cell 2, press **SCROLL** (↑).

1. Observe the analyzer temperature reading by pressing the **TEMP** key (and **SCROLL** (↑) if required). Assure that the reading is stable and the sensor acclimated to the process temperature.
2. Compare the analyzer reading to the thermometer reading. If the readings are different, proceed to step three.
3. Press the **TEMP** key (and **SCROLL** (↑) if required) then the **SELECT** key to correct the temperature display. The analyzer will display AdJ briefly, then the Numeric Display will show with digit flashing.
4. **SCROLL** (↑) and **SHIFT** (←) to display the correct value and **ENTER** it into memory.
5. Repeat this procedure for the second cell.

5.1.4 Cell Single Point Calibration. The Single Point calibration adjustment is for use only in calibrating the Model 1054B DC to match a reference instrument of known high accuracy. To use it otherwise will result in a reduction in system accuracy. By performing a single point calibration, the user overrides the calibration constant setting.

NOTE

To completely undo the single point calibration adjustment, re-enter either the cell constant or cell calibration constant of the appropriate cell. (Section 5.1.1 - 2).

NOTE

After initial installation or any cleaning procedure, the conductivity cell will require I to 2 days after insertion into the ultrapure water stream before accurate readings may be obtained. In many cases, the full 0.5% system accuracy will not be obtainable until the cell has remained in the ultrapure water stream a full 5 days.

NOTE

Pressing the **CAL** key will display the process temperature for Cell. To toggle the display for the process temperature for Cell 2, press **SCROLL** (↑).

1. Press the **CAL** (and **SCROLL** (↑) if required) key then the **SELECT** . Std will display followed by the Numeric Display with digit flashing.
2. **SCROLL** (↑) and **SHIFT** (←) to display the conductivity value of the known high accuracy and **ENTER** it into memory.

SECTION 6.0
KEYBOARD SECURITY

6.1 KEYBOARD SECURITY. Display Mnemonic COd. Select this feature to display the user defined security code. Any three digit number may be used for this code. 000 will disable the security feature. This item is used to prevent accidental changes to the calibration and configuration of the analyzer. When activated, the analyzer will allow all read functions to read normally. If an attempt is made to change a value, LOC will display followed by the Numeric Display ready for the code to be entered. A proper code will unlock the analyzer and the analyzer will return to the last function attempted. Any incorrect value will result in bAd briefly displaying. The analyzer will then return to numeric display and await the entry of the code. Once unlocked, the analyzer will allow access to all functions until the analyzer is either powered down or no keystrokes are made for a period of 2 minutes. If the code should be forgotten, pressing and holding the **ACCESS** key for 5 seconds will result in display of the code. Releasing the **ACCESS** key, then pressing **ENTER** will unlock the analyzer.

6.1.1 Keyboard Security (COd).

1. Enter Set Mode by pressing **ACCESS** key twice.
2. **SCROLL** (↑) until COd appears on the display.
3. Press **SELECT.**
4. **SCROLL** (↑) and **SHIFT** (←) to display the desired value, then **ENTER** it into memory.

NOTE

Entering 000 disables the keyboard security.

NOTE

Security feature will not activate until 2 minutes without keyboard activity or power is removed from the analyzer then restored.

SECTION 7.0
THEORY OF OPERATION

7.1 THEORY OF OPERATION. This section is a general description of how the analyzer operates. This section is for those users who desire a greater understanding of the analyzer's operation.

Utilizing a square wave measurement circuit for improved linearity and accuracy, the Model 1054B DC measures the absolute conductivity/resistivity of the measured process. The analyzer then references the conductivity/resistivity to 25°C by accurately measuring the process temperature by means of a Pt-100 or Pt-1000 RTD located in the cell.

It is commonly known that in measuring the resistivity or conductivity of ultrapure water, temperature compensation is very critical. The temperature coefficient of ultrapure water depends both on the temperature and the resistivity/conductivity of the water being tested. Figure 7-1 illustrates the relationship between the resistance and the temperature of pure water from 2 megohm-cm to 18 megohm-cm quality.

The Model 1054B DC incorporates a 100 ohm or 1000 ohm RTD for temperature measurement, and is capable of measuring and displaying temperature accurately to within ±0.1°C. Temperature measurement is resolved to .025°C and this precise measurement is used in the analyzer's temperature compensation calculation.

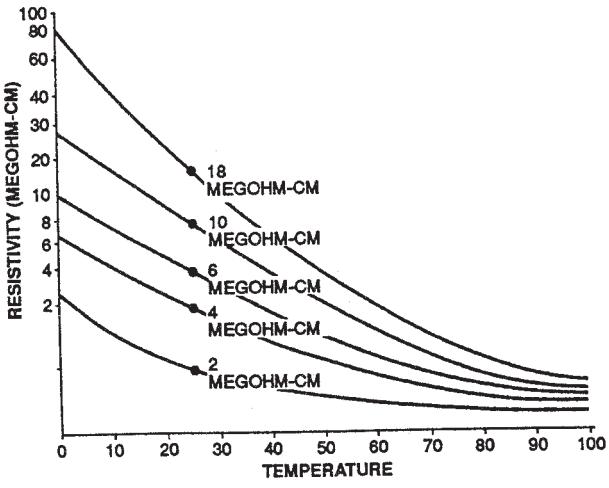


FIGURE 7-1 Resistance vs. Temperature

For neutral salts the equation that the analyzer utilizes to calculate temperature compensation is derived from the equivalent conductance of the separate ions in the total solution system. The equation is the form of:

$$C_t = C_{25}Q_S - \frac{(Q_S - Q_W)}{(18.25)}$$

Where C_t = Specific conductivity at temperature

C_{25} = Conductivity at 25°C

Q_S = Temperature coefficient of neutral salt

Q_W = Temperature coefficient of pure water

This formula takes into account the temperature coefficient of the neutral salt component and the pure H_2O component and separately calculates the conductive contribution of the solvent and solute.

This temperature compensation method not only achieves the same accuracy for water over the range of 15°C to 60°C as the General Electric equation, but also extends the accuracy from 0°C to 100°C.

For cation resin columns, a formula specific to the characteristics of pure water contaminated with minute quantities of hydrochloric acid is used to provide accuracy for cation solutions up to 9.99 µS/cm over a temperature range of 0°C to 100°C.

SECTION 8.0
DIAGNOSTICS AND TROUBLESHOOTING

8.1 DIAGNOSTICS. The Model 1054B analyzer has a diagnostic feature which automatically searches for fault conditions that would cause an error in the measured conductivity value. If such a condition occurs, the current output and relays will act as configured in default and the fault flag and display will flash. A fault code mnemonic will display at frequent intervals. If more than one fault condition exists, the display will sequence the faults at one second intervals. This will continue until the cause of the fault has been corrected. Display of fault mnemonics is suppressed when in Set Mode. Selecting the SHO item will display a history of the two most recent fault conditions unless SHO was cleared (Refer to Section 4.6).

NOTE

If the analyzer is in hold and a fault occurs, the mnemonic HLd will display during the fault sequence.

8.1.1 Fault Mnemonics. Table 8-1 lists the fault mnemonics and describes the meaning of each.

TABLE 8-1. Fault Mnemonics

Display	Description
EEP	**EEPROM write error (bad EEPROM chip).**
CHS	**ROM failure (check sum error) (bad ROM chip).**
COP	**Computer not operating properly.**
1tcH	**High temperature compensation error - Cell 1.**
1tcL	**Low temperature compensation error - Cell 1.**
FAC	**Factory calibration required.**
2tcH	**High temperature compensation error - Cell 2.**
2tcL	**Low temperature compensation error - Cell 2.**
1CLH	**Overange - Cell 1.**
2CLH	**Overange - Cell 2.**

8.1.2 Temperature Compensation. Table 8-2 is a ready reference of RTD resistance values for a Pt-1000 RTD at various temperatures. For Pt-100 values divide by 10. These are used for test and evaluation of the sensor.

TABLE 8-2. RTD Resistance Values

Temperature	Resistance
0°C	**1000 ohms**
10°C	1039.0 ohms
20°C	1077.0 ohms
25°C	1096.2 ohms
30°C	1116.7 ohms
40°C	1155.4 ohms
50°C	**1194.0 ohms**
60°C	1232.4 ohms
70°C	1270.7 ohms
80°C	1308.9 ohms
90°C	1347.0 ohms
100°C	**1385.0 ohms**
110°C	1422.9 ohms
120°C	1460.6 ohms
130°C	1498.2 ohms
140°C	1535.8 ohms
150°C	**1573.1 ohms**
160°C	1610.4 ohms
170°C	1647.6 ohms
180°C	1684.6 ohms
190°C	1721.6 ohms
200°C	**1758.4 ohms**

NOTE

Ohmic values are read across the T.C. element and are based on the stated values (R_O ±0.12%). Allow enough time for the T.C. element to stabilize to the surrounding temperature. Each 1°C change corresponds to a change of 3.85 ohms (for a Pt-1000 RTD) or .385 ohms (for a Pt 100 RTD).

8.2 TROUBLESHOOTING. The Model 1054B analyzer is designed with the state of the art microprocessor circuitry. This design incorporates programmed features that provide constant monitoring for fault conditions, and the reporting of these faults via Mnemonics on the instrument display screen. This aids in determining where to start checking for the cause of failures, and in some instances, the ability to see changes that can be used to predict future degeneration of assemblies before their complete failure.

8.2.1 Installation Failure. After completion of installation the instrument should be checked for operation. Normally this would consist of Powering up the instrument and checking for:

1. A self diagnostic fault display. Refer to Table 8-1 for brief description of problem indicated by mnemonic. Table 8-3 provides a more comprehensive problem explanation and actions that may help solve the problem.
2. A conductivity reading that is approximately correct. (Depending upon sensor installation in either air or process.) Refer to Section 8.2.3 for sensor checks.
3. Pressing several of the keypads to determine whether programming appears to be operational. Table 8-3 explains problems and actions that may be helpful in solving them.
4. Checking output for 4-20 mA output current.

8.2.2 After Operation. Troubleshooting this instrument after previous operation should follow normal troubleshooting procedures. Check display. If power is O.K. the display mnemonic will direct you to the basic area of malfunction (Sensor, Printed Circuit Boards, calibration, or temperature compensation).

Use Table 8-1 and Table 8-3 to determine area, possible problem and actions to take to remedy fault.

Faulty display. If a faulty display is suspected, enter the **SET** menu and scroll through to the dtS option. This option will activate all display segments. See Figure 3-5.

Output Circuit Testing. To check for problems in the output circuit, bypass the sensor input and analyzer calculations by setting a known output current and checking item driven by output current and checking the operation of valves, pumps, recorders, etc. For directions on how to set output current, refer to Section 4.9.

8.2.3 Sensor Troubleshooting. In addition to the sensor fault mnemonics, the analyzer can display information pertinent to determining if sensor has become coated, or if there is a conductivity versus temperature problem, or an application problem.

Sensor Coated. Conductivity cells used in pure water service require little maintenance. As with any type of in-line instrumentation, the cell should be inspected periodically. During these inspections, the following items should be checked:

NOTE

After initial installation or any cleaning procedure, the conductivity cell will require I to 2 days after insertion into the ultrapure water stream before accurate readings may be obtained. In many cases, the full 0.5% system accuracy will not be obtainable until the cell has remained in the ultrapure water stream a full 5 days.

1. Are the cell cable and connections in good condition? Is there evidence of corrosion?
2. Is the cell bent or dented? Blow dry with compressed air and inspect carefully for physical damage.
3. Is there any extraneous material lodged between the electrodes? The cell is easily inspected and can be cleaned with a blast of compressed air or by holding it holder hot tap water. Hot tap water may be run through the cell by slipping a piece of rubber tubing over the end of the cell and allowing the water to flow through the cell and out the vent holes.

For extremely dirty cell, see step 4.

4. If the conductivity cell electrodes have become extremely dirty or fouled, chemical cleaning may become necessary. Warm 10% solutions of either hydrochloric acid or sodium hydroxide may be used depending on the soil. Do not keep cells in these solutions for longer than 15 minutes. Do not have the cell connected during this procedure. Gentle brushing with a bristle brush such as a tooth brush may also be employed.

After chemical cleaning, the cell must be thoroughly rinsed in running tap water to remove strong electrolyte which may remain on the electrodes, insulators and electrode holders. This rinsing operation should continue for approximately one half hour. The cell should then be washed in several changes of distilled or deionized water over a period of several hours before being installed.

Absolute Conductivity. As an aid in determining whether a problem exists in the conductivity section of the sensor or analyzer, or the temperature compensating circuits, the absolute conductivity (the uncorrected conductivity value, without temperature compensation) of the process can be displayed. To do so:

1. Press the **ACCESS** key twice.
2. SEt will be displayed briefly followed by 1C1 n.
3. **SELECT** 1C1 n to read the absolute conductivity of cell 1.
4. **SCROLL** (↑) to display 2C1 n and **SELECT** to read the absolute conductivity of cell 2.
5. To return to normal operation, press **PV**

Temperature Sensor Accuracy. If the temperature sensor in the conductivity sensor is suspect, measuring the resistance along the T.C. element and comparing the corresponding temperature reading can be used in the evaluation of the sensor. Allow enough time for the T.C. element to stabilize to the surrounding temperature, Each 1°C change corresponds to a change of 03.85 ohms.

8.2.4 Subassembly Replacement Considerations.

CPU Board Replacement. If a problem exists on the CPU board, and replacement is required, specific procedures included with the new board must be followed or the microprocessor will be improperly programmed. Should this occur, it will be necessary to return the analyzer to the factory for reprogramming.

Power Board Replacement. if it becomes necessary to replace the power board, the CPU will need to be recalibrated following specific procedures included with the power board Failure to follow these procedures exactly will cause the microprocessor to be improperly programmed and require the return of the analyzer to the factory for reprogramming.

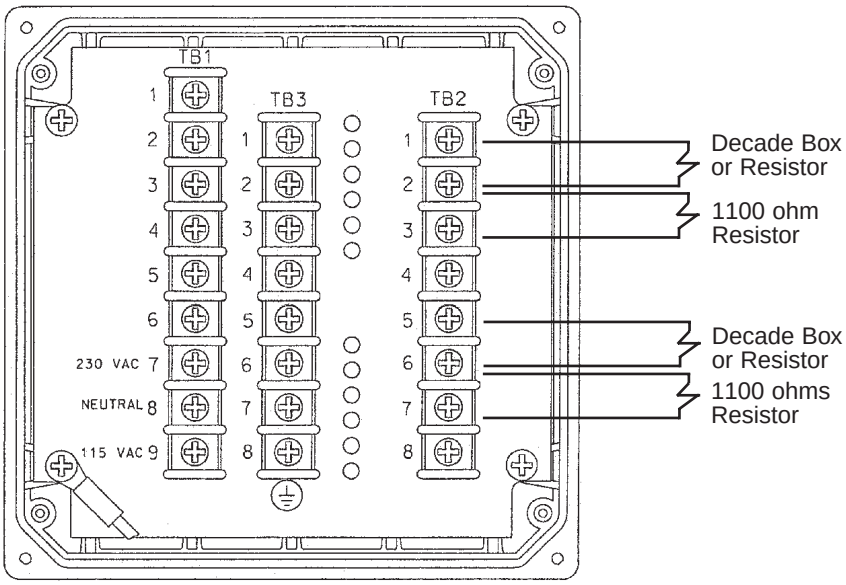
TABLE 8-3. Troubleshooting Guide

SYMPTOM	PROBLEM	ACTION
Analyzer value not the same as reference analyzer.	1. Reference analyzer incorrect. 2. Unclear what is correct. 3. Analyzer out of calibration.	1. Recalibrate reference analyzer 2. Bench test analyzer. 3. Recalibrate per Start-up and Calibration Section.
Fault code 1tcH/ 1tcL (cell 1). 2tcH/2tcL (cell 2).	1. Miswire. 2. Open or shorted RTD.	1. Check wiring between the sensor and analyzer. 2. Replace sensor.
Fault code 1CLH (cell 1). 2CLH (cell 2).	1. Process conductivity too high for sensor in use. Process contamination.	1. Check purity system.
Near zero reading	1. Open wire between sensor and analyzer. 2. Coated/fouled sensor.	1. Repair wire/check connection. 2. Clean replace/sensor.
Fault code EEP.	1. Defective EEPROM.	1. Replace CPU PCB.
Fault code CHS.	1. Defective CPU.	1. Replace CPU PCB.
No alarm relay closure.	1. Defective power card. 2. Defective CPU.	1. Replace power PCB. 2. Replace CPU PCB.
No output current.	1. Defective power board. 2. Miswired.	1. Replace power PCB. 2. Check for short.
Low output current.	1. Circuit loading with excessive resistance on output.	1. Consult output loading limits Model 1054B R specifications (600 ohms max load).
Zero conductivity reading.	1. Sensor miswired. 2. Solids coating sensor. 3. Open wire in sensor.	1. Repair wire/connection. 2. Clean sensor. 3. Replace sensor or tube.
HPS	1. Switch on CPU board in wrong position.	1. Slide switch on CPU toward front of instrument.

8.2.5 Instrument Electronic Check. This procedure will allow the operation of the analyzer to be evaluated by simulating a known conductivity input.

1. Disconnect the conductivity sensor input leads from TB2-1, 2, 3, 5, 6, and 7. Install a decade box or resistor leads to TB2-1 and TB2-2 to simulate "CELL1" input resistance, and install a decade box or resistor leads to TB2-5 and TB2-6 to simulate "CELL2" input resistance. Install leads of a 1100 ohm resistor to TB2-2 and TB2-3 for temperature resistance of "CELL1" and a second 1100 ohm resistor's leads to TB2-6 and TB2-7 for temperature resistance of "CELL2" as shown in Figure 8-1.
2. Calibrate temperature to 25°C (see Section 5.1.3).
3. Set cell constant to 1.0 (see Section 5.1.1).
4. To simulate a desired conductivity input, an appropriate resistance value may be calculated by Formula or selected from the conductivity (µmhos) vs resistance (ohms) table (see Figure 8-1).
5. Simulate conductivity input and evaluate the analyzer response.

8.3 INSTRUMENT MAINTENANCE. To maintain the appearance and extend the life of the enclosure, it should be cleaned on a regular basis using a mild soap and water solution followed by a clean water rinse.



Formula:

$$\text{Conductivity} = \frac{1}{\text{Resistance}} \times 1{,}000{,}000$$

Table:

Conductivity (µmhos)	vs	Resistance (kilohms)
5		200,000
10		100,000
100		10,000
1,000		1,000
10,000		100
20,000		50

FIGURE 8-1. Simulate Conductivity Input

SECTION 9.0
RETURN OF MATERIAL

9.1 GENERAL.

To expedite the repair and return of instruments, proper communication between the customer and the factory is important. Before returning a product for repair, call 1-949-863-1181 for a Return Materials Authorization (RMA) number.

9.2 WARRANTY REPAIR.

The following is the procedure for returning instruments still under warranty:

1. Call Rosemount Analytical for authorization.
2. To verify warranty, supply the factory sales order number or the original purchase order number. In the case of individual parts or sub-assemblies, the serial number on the unit must be supplied.
3. Carefully package the materials and enclose your "Letter of Transmittal" (see Warranty). If possible, pack the materials in the same manner as they were received.
4. Send the package prepaid to:

   Rosemount Analytical Inc., Uniloc Division
   Uniloc Division
   2400 Barranca Parkway
   Irvine, CA 92606

   Attn: Factory Repair

   RMA No. _____

   Mark the package: Returned for Repair

   Model No. ____

9.3 NON-WARRANTY REPAIR.

The following is the procedure for returning for repair instruments that are no longer under warranty:

1. Call Rosemount Analytical for authorization.
2. Supply the purchase order number, and make sure to provide the name and telephone number of the individual to be contacted should additional information be needed.
3. Do Steps 3 and 4 of Section 9.2.

NOTE

Consult the factory for additional information regarding service or repair.

RETURN OF MATERIALS REQUEST

•IMPORTANT!
This form must be completed to ensure expedient factory service.

CUSTOMER

FROM:	RETURN	BILL TO:
_____	_____	_____
_____	_____	_____
_____	_____	_____

NOTICE TO SENDER

CUSTOMER/USER MUST SUBMIT MATERIAL SAFETY SHEET (MSDS) OR COMPLETE STREAM COMPOSITION, AND/OR LETTER CERTIFYING THE MATERIALS HAVE BEEN DISINFECTED AND/OR DETOXIFIED WHEN RETURNING ANY PRODUCT, SAMPLE OR MATERIAL THAT HAVE BEEN EXPOSED TO OR USED IN AN ENVIRONMENT OR PROCESS THAT CONTAINS A HAZARDOUS MATERIAL **ANY OF THE ABOVE THAT IS SUBMITTED TO ROSEMOUNT ANALYTICAL WITHOUT THE MSDS WILL BE RETURNED TO SENDER C.O.D.** FOR THE SAFETY AND HEALTH OF OUR EMPLOYEES. WE THANK YOU IN ADVANCE FOR COMPLIANCE TO THIS SUBJECT.

SENSOR OR CIRCUIT BOARD ONLY:
(Please reference where from in MODEL / SER. NO. Column)

1. PART NO. _____	1. MODEL _____	1. SER. NO. _____
2. PART NO. _____	2. MODEL _____	2. SER. NO. _____
3. PART NO. _____	3. MODEL _____	3. SER. NO. _____
4. PART NO. _____	4. MODEL _____	4. SER. NO. _____

REASON FOR RETURN

PLEASE CHECK ONE:

☐ REPAIR AND CALIBRATE
☐ EVALUATION
☐ REPLACEMENT REQUIRED? ☐ YES ☐ NO
☐ DEMO EQUIPMENT NO. _____
☐ OTHER (EXPLAIN) _____

DESCRIPTION OF MALFUNCTION:

_____
_____
_____

REPAIR STATUS

WARRANTY REPAIR REQUESTED:

☐ YES-REFERENCE ORIGINAL ROSEMOUNT ANALYTICAL ORDER NO. _____
CUSTOMER PURCHASE ORDER NO. _____
☐ NO-PROCEED WITH REPAIRS-INVOICE AGAINST P.O. NO. _____
☐ NO-CONTACT WITH ESTIMATE OF REPAIR CHARGES: LETTER ☐ _____
PHONE ☐ _____

NAME _____ PHONE _____
ADDRESS _____
_____ ZIP _____

RETURN AUTHORITY FOR CREDIT ADJUSTMENT [Please check appropriate box(s)]

☐ WRONG PART RECEIVED
☐ DUPLICATE SHIPMENT
☐ RETURN FOR CREDIT
☐ REPLACEMENT RECEIVED
REFERENCE ROSEMOUNT ANALYTICAL SALES ORDER NO. _____
RETURN AUTHORIZED BY: _____
WARRANTY DEFECT _____
_____

24-6047

Rosemount Analytical Inc.
Uniloc Division
2400 Barranca Parkway
Irvine, CA 92606 USA
Tel: 1-800-854-8257
Fax: (949)-474-7250

ROSEMOUNT® ANALYTICAL
FISHER-ROSEMOUNT™ Managing The Process Better.™

The right people, the right answers, right now.

Immediate, Reliable Analytical Support

Now there's a way to quickly get the right answers for your liquid analytical instrumentation questions: the Analytical Customer Support Center.

Our staff of trained professionals are ready to provide the information you need. If you are placing an order, verifying delivery, requesting application information, or just want to contact a Rosemount Analytical representative, a toll-free call to 1-800-854-8257 will provide you with the right people, the right answers, right now.

A Worldwide Network of Sales and Service

The Rosemount customer sales and service organization comprises a network of fully equipped support centers strategically located throughout the world. From many of these locations, the Rosemount Group provides support, distribution of finished products, repair facilities, and training for our customers.

U.S. Field Service

Field Watch Response Center
1-800-654-7768

International

ARGENTINA
Emerson Argentina
Buenos Aires
54 1 780311,
795-9338

AUSTRALIA
Fisher-Rosemount
Pty. Ltd.
Bayswater, Victoria
(61)(39)721-0200

AUSTRIA
Fisher-Rosemount - AG
Neudorf
(43)(2236)607

BELGIUM
Fisher-Rosemount
N.V./S.A.
Diegem
(32)(2)716-77-11

BRAZIL
Fisher-Rosemount do
Brasil Industria e
Comercio Ltda.
Sorocada
(55)(11)228 3788

CANADA
Rosemount Instruments
Ltd.
Calgary
(800) 268-1151

CHINA
Fisher-Rosemount
Pudong, Shanghai
(86)(215)899-4415

CROATIA
Fisher-Rosemount
Croatia
Zagreb
(385)(1)305 071

CZECH REPUBLIC
Fisher-Rosemount
Praha
(420)(2)81002666-7

DENMARK
Fisher-Rosemount A/S
Alleroed
(45)48-17-03-33

ENGLAND
Fisher-Rosemount
Limited
Bognor Regis
(44)(1243)863-121

FINLAND
Oy Valment-Rosemount
AG
ESPOO
(358)(9)549-541

FRANCE
Fisher-Rosemount S.A.
Lyon
(33)(7)215-98-00

GERMANY
Fisher-Rosemount
GmbH & Co.
D-63549 Hasselroth
(49)(6055)884-0

HUNGARY
Fisher-Rosemount
Budapest
(36)(1)4624001

INDIA
Fisher-Rosemount
(India) Ltd.
New Bombay
(91)(22)762-9191/9200

ITALY
Fisher-Rosemount
Italia s.r.l.
Milan
(11)(39)(39)27021

JAPAN
Fisher-Rosemount Japan
Co., Ltd.
Tokyo
(81)(3)5403-8529

KOREA
Fisher-Rosemount
Korea Ltd.
Seoul
(82)(2)515-2321

MIDDLE EAST
Fisher-Rosemount
Middle-East Dubai,
United Arab Emirates
(971)(4)835235

MALAYSIA
Rosemount Instruments
SDN BHD
Kuala Lumpur
(60)(3)244-5688

MEXICO
Fisher-Rosemount S.A.
de C.V.
Tlalnepantla
(011)(525)728-0885

NEW ZEALAND
Fisher-Rosemount
Auckland
(64)(9)444-1646

NORWAY
Fisher-Rosemount A/S
Porsgrunn
(47)35-55-5600

POLAND
Fisher-Rosemount
Warszawa
(48)(22)857 3856/
647 3865

PORTUGAL
Fisher-Rosemount
Portugal Instrumentos
Limitada
Alfragide
(351)(1)472 88 50

PUERTO RICO
Fisher-Rosemount Inc.
Guaynabo
(787)782-9955, 9956,
or 9957

ROMANIA
Fisher-Rosemount
Bucharest
40 1230 4149/50/59

RUSSIA
Fisher-Rosemount
Moscow
7095 245 86 86

SINGAPORE
Fisher-Rosemount
Singapore
Pte, Ltd
(65)777-8211

SLOVAK REPUBLIC
Fisher-Rosemount scr
Bratislava
42 17 761 973

SPAIN
Fisher-Rosemount S.A.
Madrid
(34)(1)358-91-41

SWEDEN
Fisher-Rosemount AB
Karlstad
(46)(54)19-0090

SWITZERLAND
Fisher-Rosemount AG
Baar
(41)(41)768 62 60

THE NETHERLANDS
Fisher-Rosemount BV
Rijswijk
(31)(70)413-6542

TURKEY
Fisher-Rosemount
Proses Kontrol Ltd. Sri
Istanbul
(90)(216)49 240 42-46

ROSEMOUNT® ANALYTICAL

FISHER-ROSEMOUNT™ Managing The Process Better.™

FOLD ALONG DOTTED LINES

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST-CLASS MAIL PERMIT NO. 13068 IRVINE CA

POSTAGE WILL BE PAID BY ADDRESSEE

ROSEMOUNT ANALYTICAL INC
2400 BARRANCA PKWY
IRVINE CA 92606-9832

DOUBLE WARRANTY REGISTRATION

Date of Purchase (of instrument) _____
Company Name _____
Address _____
City _____
State/Country _____ Zip _____
Mail Drop _____

Your Name _____
Title _____
Phone Number _____
E-Mail Address _____
Fax Number _____

Model number of instrument (e.g., 3081pH) _____
***Serial number** (located on nameplate) _____

How many liquid analyzers are purchased at this site per year? (check one)

1 to 5 ___ 6 to 10 ___ 10 to 20 ___ 20 or more ___

What are your principal applications? _____

_____

Through which of the following means do you prefer receiving product updates and application news? (check one)

___ sales representative
___ mail
___ fax (my fax number is _____)
___ E-mail (my e-mail address is _____)
___ phone

CUSTOMER SATISFACTION SURVEY

Please let us know how satisfied you are with your new instrument.

MODEL _____

How easy was it to do the following:	Very Easy	Somewhat Easy	Not Very Easy	Not At All Easy
Unpack	1	2	3	4
Wire	1	2	3	4
Mount	1	2	3	4
Calibrate	1	2	3	4
Program	1	2	3	4
Operate	1	2	3	4

How satisfied were you with the following:	Very Satisfied	Somewhat Satisfied	Not Very Satisfied	Not At All Satisfied
The instrument manual	1	2	3	4
The instrument's performance	1	2	3	4

Please explain any 3's and 4's above:

_____

_____

_____

Thank you,
Mike Stoessl
President, Rosemount Analytical-Uniloc Division

For Customer Support
24 hours a day/365 days a year,
Call 1-800-854-8257

Complete this registration, fold it in thirds so the return address shows, and drop it in any mailbox, or visit our web-site at *www.RAuniloc.com* and register on-line to double your standard warranty from 1 year to 2 years.

***Serial number must be indicated to register for extended warranty.** *Warranty applicable only to instrument accompanying this manual.*

WARRANTY

Goods and part(s) (excluding consumables) manufactured by Seller are warranted to be free from defects in workmanship and material under normal use and service for a period of twelve (12) months from the date of shipment by Seller. Consumables, pH electrodes, membranes, liquid junctions, electrolyte, O-rings, etc. are warranted to be free from defects in workmanship and material under normal use and service for a period of ninety (90) days from date of shipment by Seller. Goods, part(s) and consumables proven by Seller to be defective in workmanship and / or material shall be replaced or repaired, free of charge, F.O.B. Seller's factory provided that the goods, parts(s), or consumables are returned to Seller's designated factory, transportation charges prepaid, within the twelve (12) month period of warranty in the case of goods and part(s), and in the case of consumables, within the ninety (90) day period of warranty. This warranty shall be in effect for replacement or repaired goods, part(s) and consumables for the remaining portion of the period of the twelve (12) month warranty in the case of goods and part(s) and the remaining portion of the ninety (90) day warranty in the case of consumables. A defect in goods, part(s) and consumables of the commercial unit shall not operate to condemn such commercial unit when such goods, parts(s) or consumables are capable of being renewed, repaired or replaced.

The Seller shall not be liable to the Buyer, or to any other person, for the loss or damage, directly or indirectly, arising from the use of the equipment or goods, from breach of any warranty or from any other cause. All other warranties, expressed or implied are hereby excluded.

IN CONSIDERATION OF THE STATED PURCHASE PRICE OF THE GOODS, SELLER GRANTS ONLY THE ABOVE STATED EXPRESS WARRANTY. NO OTHER WARRANTIES ARE GRANTED INCLUDING, BUT NOT LIMITED TO, EXPRESS AND IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

RETURN OF MATERIAL

Material returned for repair, whether in or out of warranty, should be shipped prepaid to:

Rosemount Analytical Inc.
Uniloc Division
2400 Barranca Parkway
Irvine, CA 92606

The shipping container should be marked:

Return for Repair
Model _____

The returned material should be accompanied by a letter of transmittal which should include the following information (make a copy of the "Return of Materials Request" found on the last page of the Manual and provide the following thereon):

1. Location type of service, and length of time of service of the device.
2. Description of the faulty operation of the device and the circumstances of the failure.
3. Name and telephone number of the person to contact if there are questions about the returned material.
4. Statement as to whether warranty or non-warranty service is requested.
5. Complete shipping instructions for return of the material.

Adherence to these procedures will expedite handling of the returned material and will prevent unnecessary additional charges for inspection and testing to determine the problem with the device.

If the material is returned for out-of-warranty repairs, a purchase order for repairs should be enclosed.

The right people,
the right answers,
right now.

UNILOC DIVISION
CUSTOMER SUPPORT CENTER
1-800-854-8257

Rosemount Analytical Inc.
Uniloc Division
2400 Barranca Parkway
Irvine, CA 92606 USA
Tel: (949) 863-1181
http://www.RAuniloc.com

ON-LINE ORDERING NOW
AVAILABLE ON OUR WEB SITE
http://www.RAuniloc.com

Credit Cards for U.S. Purchases Only.

ROSEMOUNT® ANALYTICAL

FISHER-ROSEMOUNT™ Managing The Process Better.™

© Rosemount Analytical Inc. 1999